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Environmental Impact Statement
Tampa Electric Company, Big Bend Unit 4

(U.S.) Environmental Protection Agency
Atlanta, GA

Jan 82

U.S. Department of Commerce
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Region 4
345 Courtland Street, NE
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Tampa Electric Company Big Bend Unit 4

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

EPA 904/9-81-084
NPDES Application Number:
FL 0037044

Final
Environmental Impact Statement

for
Proposed Issuance of a New Source National
Pollutant Discharge Elimination System Permit

to
Tampa Electric Company
Big Bend Unit 4
Hillsborough County, Florida

Prepared by:
U.S. Environmental Protection Agency
Region IV, Atlanta, Georgia 30365

Cooperating Agency:
U.S. Army Corps of Engineers
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Tampa Electric Company proposes to construct and operate a 417 MW (net) capacity coal-fired electric generating plant at the existing Big Bend complex adjacent to Hillsborough Bay in west-central Hillsborough County, Florida. The EIS examines project alternatives, impacts, and mitigative measures related to groundwater, air, surface water, ecological, and socioeconomic and cultural systems.

Comments will be received until MAR 15 1982

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Jan. 22, 1982
Date

Executive Summary
for
Environmental Impact Statement

Big Bend Unit 4
Tampa Electric Company

( ) Draft
(X) Final

U.S. Environmental Protection Agency, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

1. Type of Action: Administrative (X) Legislative ( )

2. Description of Action

Tampa Electric Company (TECO) is proposing to construct and operate a 417 MW (net) capacity coal-fired steam electric generating plant at the existing Big Bend complex in Hillsborough County, Florida. The EPA Region IV Administrator has declared the proposed plant to be a new source as defined by Section 306 of the Clean Water Act. Operation of Big Bend Unit 4 would require a National Pollutant Discharge Elimination System (NPDES) permit. Issuance of this permit would be a major Federal action significantly affecting the quality of the human environment and subject to the provisions of the National Environment Policy Act (NEPA). Consequently, an Environmental Impact Statement (EIS) has been prepared.

As a public utility TECO is obligated to efficiently provide adequate electric power to its service area customers. TECO has conducted an evaluation of its ability to fulfill future electric power commitments and has determined the addition of a generating unit is essential to meeting projected future demands. TECO's forecasted growth rate assumes the Public Service Commission's conservation goals of reductions in peakload and energy usage will be achieved. Accounting for conservation, a reserve margin of 13% would result in the winter of 1985/1986 without Big Bend Unit 4. Firm commitments for the purchase of power at an economically competitive rate have been studied and have been determined not to be cost and time effective. There is a high probability that the forecasted load could not be served when outages occur or maintenance is required.

Based on testimony and evidence entered during the proceedings conducted on the need for Big Bend Unit 4, the Florida Public Service Commission (FPSC) concluded that operation of Unit 4 as planned (1985) is essential to avoid seriously jeopardizing future service to TECO customers. The FPSC concluded that the cost benefit economics of constructing Big Bend Unit 4 have been demonstrated and the "need" for Big Bend Unit 4 should be certified.

Additionally, the FPSC stated that evidence suggests substantial socioeconomic benefits could be realized should the coal-fired unit displace oil fired generation. Approximately 3.9 million barrels of oil could be displaced annually by Big Bend Unit 4. This could reduce Florida's dependence on imported oil by $232 million (1980 dollars).

The proposed Unit 4 and supporting facilities would be located on approximately 230 acres at TECO's 1675 acre Big Bend complex adjacent to the Tampa Bay system on the eastern shore of Hillsborough Bay in west-central Hillsborough County. The City of Ruskin is approximately 5 miles south of the complex and Tampa is approximately 12 miles to the north. TECO currently operates 3 coal-fired generating units totaling 1336 MW at the complex. Unit 4 would be constructed directly adjacent to the existing units and would be operational for approximately 30 years.

Major buildings and structures that would comprise Big Bend Unit 4 are the turbine hall and boiler complex, electrostatic precipitators, flue-gas-desulfurization (FGD) facilities, FGD by-product handling and storage facilities, and condenser cooling water intake and discharge structures. The unit is designed to share certain facilities with the existing units including a stack, transmission towers, coal unloading and handling facility, and an existing percolation/evaporation wastewater pond and spray-irrigation field. Stack gases would be exhausted via the Unit 3 stack which was designed to accommodate 2 units.

The Unit 4 turbine, boiler, precipitator, limestone storage and handling, and FGD system would occupy approximately 7 acres. Approximately 7 additional acres would be committed for the coal reserve and service facilities associated with Unit 4. Another 121 acres would be used for an ash settling pond system (fly-ash and bottom ash) and approximately 97 acres for an FGD storage/disposal area. The wastewater treatment system occupies about 40 acres and would not require enlargement.

Makeup cooling water for Unit 4 would be drawn from the existing intake canal for Units 1, 2, and 3. These units currently utilize once-through cooling for waste heat rejection. The intake structures are equipped with conventional screens. Unit 4 would be equipped and Unit 3 would be retrofitted with fine mesh screens (0.5 mm) to reduce the entrainment and impingement losses of marine organisms associated with withdrawing the tremendous quantities of water needed for cooling purposes.

Approximately 347 million gallons per day of Hillsborough Bay water would be required for Unit 4 cooling purposes. An additional 2.1 million gallons per day of freshwater would be required for inplant uses. TECO would obtain the freshwater from the Hillsborough County water system. TECO is presently studying the feasibility of using non-potable water for inplant uses. Under provisions of the Site Certification Order, TECO is required to use non-potable water whenever possible.

Approximately 347 million gallons per day of heated water would be discharged into the existing discharge canal for Units 1, 2, and 3. Other wastewaters (inplant waste streams, fly ash sluicing system blowdown, coal pile runoff, sanitary wastes) would be directed to the existing wastewater treatment system and recycled or disposed of by land application. Several wastes including boiler blowdown, FGD system blowdown, bottom ash sluicing system blowdown, condenser biocide additions, and yard drainage would discharge into the discharge canal.

Unit 4 would burn approximately 950,000 tons of medium-sulfur bituminous coal per year. Fuel would be delivered by covered barges using the existing handling facilities. Coal pretreatment, boiler design features, and air pollution control devices would combine to ensure that operation of the proposed unit complies with applicable air quality regulations. Particulate matter would be controlled with an electrostatic precipitator. Sulfur dioxide emissions would be minimized by coal washing and tail-gas scrubbing using an FGD system. The formation of nitrogen oxides and carbon monoxide during combustion would be inhibited by the design and proper operation of the proposed boiler, furnace, and combustion air control system.

Bottom ash, pyrites removed from the coal prior to combustion, economizer ash, and fly ash would be collected and sluiced to settling ponds; subsequently, the dewatered waste material would be disposed of onsite in disposal cells. Fly ash would be available for sale as future markets allow. High-quality gypsum (calcium sulfate) generated as a byproduct of the FGD system would be handled and stored onsite. The storage of this byproduct would be either short or long term depending on its marketability. Permanent disposal would include onsite landfilling of the residual material.

Transmission facilities to accommodate Unit 4 would be limited to installation of a new transmission circuit. No offsite transmission facilities would be required.

3. Major Alternatives Considered

A. Management alternatives (conservation, purchases of power, reactivating and uprating older units, and joint projects)

Alternatives were evaluated primarily with regard to meeting TECO's forecasted demands. The FPSC concluded that should their conservation goals be attained Big Bend Unit 4 would not be needed from a peninsular standpoint. However, if the goals were not attained additional peninsular generating capacity may be needed. For the TECO service area, the FPSC concluded that Big Bend Unit 4 or an equivalent in generating capacity would be needed by 1985 despite TECO's achievement of the FPSC's goals.

TECO does not have any retired units and uprating of existing units would not produce the amount of generating capacity needed. The FPSC concluded that firm purchases of power from other Florida utilities, the Tennessee Valley Authority, and other out-of-state utilities are not cost or time effective on the basis of economics considered. Despite this conclusion, TECO will continue to seek purchase contracts that are favorable to ratepayers.

B. Energy source alternatives (nuclear, oil, gas, coal, hydroelectric, solar)

Major consideration was directed toward the state of the art of these technologies, fuel availability, application to the siting region, and construction time constraints. The proposed coal-fired unit was selected as desirable based on environmental considerations (in conjunction with siting alternatives), available technology, national fuel use policies, and engineering, licensing, and construction lead times. Hydroelectric facilities of the capacity needed lack the requisite geological conditions in Florida, and the Powerplant and Industrial Fuel Act of 1978 generally prohibits the use of petroleum as the fuel source for power plants. Nuclear based generating plants require extremely long lead times for licensing and construction. Additionally, the Big Bend complex is located very near the Tampa-St. Petersburg metropolitan area. Lastly, the nuclear alternative would be more appropriate for a much larger sized unit than the 417 MW facility planned.

C. Siting Alternatives

A detailed siting analysis was performed to identify potential sites and to assess their environmental and engineering suitability for a 417 MW coal-fired facility. An initial screening yielded 13 candidate sites which were further evaluated on more specific environmental and engineering criteria. From this process 3 prime sites were identified (Big Bend, Peace Creek, Highland). Due to the existance of 3 units at Big Bend and potential reservations regarding water availability for cooling requirements at the other sites, Big Bend was selected as the preferred site for the proposed power plant.

D. Cooling System Alternatives

Cooling alternatives evaluated included once-through cooling with conventional and fine mesh screens, cooling towers, and cooling ponds. Cooling water sources considered included Hillsborough Bay, saline groundwater, freshwater (groundwater and surface water), and treated municipal wastewater.

Cooling system evaluation was a major issue in the NEPA process. Prior to commencement of the EIS, EPA Region IV had found that operation of Units 1, 2, and 3 was entraining significantly great numbers of eggs and larvae of fish and shellfish so as to adversely effect the aquatic ecosystem of Hillsborough Bay. Subsequently, modifications to the conventional once-through systems (shutting off the dilution pumps) were instituted to reduce the entrainment impacts. These impacts were reduced by approximately 36% with no substantial and unacceptable thermal impact on the aquatic resources of Hillsborough Bay.

Use of Hillsborough Bay as a source of cooling water in conjunction with conventional screens on the once-through cooling intake structure was judged to be an unacceptable alternative for Unit 4 because the entrainment and impingement losses for Units 1-4 would be potentially adverse.

EPA's tentative determination is that once-through cooling with fine mesh screens on the Units 3 and 4 intake structures would not result in unacceptable adverse entrainment impacts from the Big Bend complex. EPA tentatively has determined that thermal impacts to be associated with operation of Units 1-4 would not cause an unacceptable adverse impact.

The other major cooling system alternative considered was a cooling tower for Unit 4. With this alternative, entrainment impacts and thermal impacts would be less severe. However, salt drift associated with operation of the cooling tower could potentially cause an adverse impact on the agricultural industry adjacent to the complex. A mechancial draft cooling tower would cost $40 million more than the fine mesh screen option.

Cooling ponds are not a viable alternative since the required land is unavailable at the Big Bend complex and at other sites. Use of freshwater for cooling purposes is inconsistent with the water management policies of the Southwest Florida Water Management District. Freshwater is becoming a critical resource in Florida and provisions for its distribution and utilization are structured toward more essential needs.

A potential source of cooling water considered in the analysis was that of treated municipal wastewater. Because the water would need to be transported in a pipeline for approximately 6 miles, it was judged to be a less viable alternative economically and potentially environmentally (cooling towers would be needed) than the once-through cooling with fine mesh screens alternative. There would be no entrainment/impingement impacts associated with this alternative.

E. Wastewater treatment alternatives

Wastewater treatment and discharge systems were evaluated to assess meeting regulatory requirements and to maximize reuse of water. The wastewater treatment system currently in operation at the Big Bend complex is sized to accommodate wastewater from Unit 4. Alternatives to the neutralization, recycling, land application system in use include reverse osmosis and precipitation of metal containing wastes prior to discharge. However, because the ambient water quality levels in the Tampa Bay system already exceed water quality standards these were not considered essential alternatives for protecting the existing water quality.

F. Air emissions control alternatives

Air emissions control system alternatives were evlauated considering the state of the art of emission control technology, environmental impacts, and economics. Major sulfur dioxide (SO_2) control alternatives included coal beneficiation and several FGD options. Major particulate control alternatives included wet scrubbers, fabric filters, mechanical collectors, and an electrostatic precipitator. Nitrogen oxides (NO_x) control alternatives included application of various combustion technology strategies.

TECO proposes to utilize a limestone scrubbing system to control SO_2, an electrostatic precipitator to control particulates, and an off-stoichiometric combustion boiler to control NO_x. A Prevention of Significant Deterioration (PSD) permit has been issued. Review of this analysis indicates Federal and State air quality standards would not be violated by the proposed facility.

G. Residual waste disposal

Alternatives for flyash and FGD sludge focused on marketing the waste and on onsite disposal. TECO proposes to market the flyash and FGD byproduct. Provisions have been made to dispose of the residual wastes onsite if suitable markets become unavailable.

H. No-action alternative

A no-action alternative was evaluated to consider the effects and implications of not issuing an NPDES permit to TECO for Unit 4. Based on the FPSC analysis, construction of Unit 4 is essential to meeting projected electrical demands in the TECO service area. Without Unit 4, TECO's reserve capacity after 1985 would be insufficient to ensure adequate generating capability during outages or scheduled maintenances.

An option available to TECO should an NPDES permit not be issued is purchase of power. The FPSC has stated that purchase of power contracts with Florida and out-of-state utilities have been investigated by TECO. Florida Power Corporation (FPC) and Florida Power and Light (FPL) have no available capacity from their certified units. Further, efforts to obtain capacity from other utilities have been determined not to be cost or time effective on the basis of the economics considered.

Environmental impacts associated with ground clearing and loss of land use to the plant facilities and residual disposal areas would not occur if the facility were not permitted and constructed. Air emissions in the Tampa Bay area would not increase as a result of the Big Bend complex. Additionally, an increase in the thermal impact from the Big Bend complex to the adjacent aquatic ecosystem would not occur. Loss of aquatic organisms by entrainment/impingement would not be effected by the no-action alternative since use of fine mesh screens on Units 3 and 4 would limit the losses from the 4 unit complex to approximately those currently observed for Units 1, 2, and 3.

An economic benefit to the Florida peninsular system would also not be realized if Big Bend Unit 4 were not constructed. The FPSC has evaluated evidence submitted during the need for power proceedings and has stated in their Order that based on the difference between coal and oil generation costs, an approximate savings of $232 million (1980 dollars) could be realized by construction and operation of Unit 4.

I. EPA's Environmentally Preferred Alternative And Recommended Action

From a purely environmental perspective not constructing Big Bend Unit 4 would apparently be preferable. Based upon the FPSC's findings there is apparently sufficient generating capacity available in the Florida peninsular grid so that construction of Big Bend Unit 4 would be unnecessary. However, in order to meet future TECO service area demands TECO would be required to purchase power from other utilities. Because the two major Florida utilities (FPC and FPL) have no available capacity from their certified units, purchase of power from out-of-state utilities would likely be necessary. The FPSC has stated that on the basis of the economics considered this option would not be cost or time effective. Additionally, the FPSC has stated that substantial socioeconomic benefits could be realized through displacement of foreign oil if Unit 4 were constructed.

When the economic findings as stated in the FPSC Order are considered, other aspects become significant from a permit issuance standpoint. Consequently, based upon the positive need for power findings of the FPSC and EPA's evaluation of the impacts of the proposed project and alternatives, EPA finds the project alternative proposed by TECO to be environmentally acceptable.

As defined in preceding paragraphs, this alternative specifies constructing a 417 MW facility at the Big Bend complex. A once-through cooling system with fine mesh screens on the Units 3 and 4 intake structures would be employed. Hillsborough Bay would serve as the source of cooling water. Air emissions control technology includes electrostatic precipitators for particulates, flue-gas desulfurization (FGD) for SO_2, and boiler design for NO_x.

EPA tentatively proposes to issue an NPDES permit to Tampa Electric Company for Big Bend Unit 4 as proposed and as described in the Draft EIS. Several measures to mitigate environmental impacts of the project (in addition to those incorporated in the proposed project) have been identified during the NEPA process and have been included as Part III conditions to the NPDES permit.

4. Summary of Major Environmental Impacts of the Proposed Project

The impacts associated with the facility would be a consequence of the collective interaction of the various system alternatives (fuel source, site, cooling system, air emissions control, residual waste disposal, wastewater treatment) identified with the proposed project. The primary emphasis of the assessment of alternatives focused on identifying the nature and degree of the associated impact and determining means to minimize adverse impacts.

Construction

The direct effect of constructing Unit 4 and attendant facilities would be a commitment of 230 acres of land at the complex. An additional 40 acres would be affected by construction related activities. This land has been disturbed during construction of Units 1, 2, and 3 and is presently characterized as pasture and agricultural land. As a result, wildlife in these areas would be forced to relocate or more likely would be lost. This is not considered a major impact since the area is not a locally important habitat and has been disturbed in the past.

Jackson Branch which presently traverses the area proposed for use as bottom and fly-ash disposal ponds would be relocated east and north of these ponds. Approximately 2400 feet of channel would be filled and 2900 feet of new channel would be constructed. Because Jackson Branch is an intermittent stream minimal adverse impacts are anticipated from this activity.

Approximately 1110 cubic yards of silt and sand would be dredged from the existing intake and discharge canals during placement of the intake and discharge structures. Construction activities would be scheduled to avoid potential impacts to the manatee. Sedimentation prevention measures (silt barriers) have been included in the proposed project to reduce impacts to the aquatic system during dredging operations. The Corps of Engineers (COE) is preparing to issue a dredge and fill permit to TECO for construction of the intake and discharge structures pending completion of the environmental review process. Restoration of Jackson Branch is also included in the COE's permitting action.

No point source discharges of construction or site runoff to waters of the United States is anticipated during the construction phase. This objective would be achieved through implementation of an erosion control program. However, there would be a discharge of dewatering wastes to both the intake and discharge canals during construction.

Air quality would be effected by fugitive dust (particulates) during heavy construction activities. Dust suppression controls would be utilized to minimize these impacts. Additional air quality impacts can be expected from vehicle emissions associated with commuting of the construction force.

The majority (90%) of the peak work force (580 workers) is expected to be from the Tampa area. Consequently, an inmigration to the Tampa area of 58 workers and their families is anticipated. No major impacts on housing or public services are expected. Increased vehicular traffic in the vicinity of the complex is anticipated but should not present a traffic control concern. Acoustics impacts should be minimal and would be associated primarily with setting of the steam valves.

Operation

Impacts of operations of Big Bend 4 would primarily affect air resources, the groundwater regime, and the aquatic environment of the Tampa Bay system.

Approximately 347 million gallons per day of Hillsborough Bay water would be required for Unit 4 cooling purposes. This would increase the total Big Bend cooling water requirements to 1388 million gallons per day. The entrainment impacts associated with withdrawing these quantities of bay water are anticipated to be approximately equal to the impacts currently associated with operation of Units 1, 2, and 3. TECO tested a prototype of a fine mesh screened intake structure during a 1980 study program approved by EPA. The results of this program indicated that fine mesh screens appeared to be 56% effective in screening eggs and larvae from the source water. Fish eggs and invertebrate larvae (drum and stone crab) collected from the fine mesh screen were subject to a low level of mortality. Since Units 3 & 4 would use fine mesh screens to reduce entrainment mortality at the Big Bend complex, EPA concluded that fine mesh screening of the intake structures would be a viable technology to minimize entrainment effects. Suggested changes in the design of the intake system and organism return system would be a means to improve the screening technology and decrease organism mortality.

The addition of Big Bend 4 would increase the heat load to the bay by 33% because of the greater volumes of heated water discharged from the complex. At 100% load (Units 1-4) the surface area of the Tampa Bay system enclosed by the 1° C (1.8° F) isotherm at any one time would total 3623 acres (1449 ha) and that by the 5° C (9° F) isotherm would total 380 acres (150 ha). This represents a 2% increase in the area enclosed by the 1° C isotherm and a 54% increase in the area enclosed by the 5° C isotherm. An enlargement of the benthic area presently adversely impacted by Units 1, 2, and 3 is expected. This area would increase from 114 acres (46 ha) to 132 acres (54 ha). EPA tentatively has determined that this does not represent an unacceptable adverse impact to the benthos of the Tampa Bay system.

Certain process wastewaters (boiler, bottom ash, and FGD system blowdowns) would be discharged to the Tampa Bay system. Because ambient levels of several metals in the bay water and intake canal exceed Florida Water Quality Standards, discharge of these wastes would violate the standards. TECO has received a variance to the standards from the State of Florida. Analysis has indicated that there would be no analytically detectable increase in the levels of these metals in the discharge canal as a result of the operations of Unit 4. Consequently, no significant impacts are anticipated.

Chlorine is to be used to prevent biofouling of condenser tubes and would be discharged at maximum levels of 0.2 mg/l (expressed as total residual oxidants, TRO). Detailed die-away studies were to be conducted prior to the Final EIS to assure a 0.01 mg/l TRO level can be achieved in the 6.1 acre discharge canal. This study was attempted and halted since chlorine residuals at the point of discharge were undetectable. Die-away studies will be suspended until chlorine residuals are detectable in the discharge canal.

Impacts to the groundwater regime could occur in the form of leachate from the bottom ash and FGD disposal areas, wastewater pond, spray irrigation field, and coal pile. Primary constituents of the leachate would include acidity, trace metals, and dissolved solids. Movement of leachate would be toward the Tampa Bay system due to natural groundwater flow. Because of the existing groundwater quality and Tampa Bay water quality, adverse impacts to the area are expected to be minimal.

Associated with the spray irrigation system, a groundwater mound would form under the TECO complex. Approximately 0.4 gallons per minute of seepage to the Floridan aquifer is anticipated.

Principal atmospheric emissions from the facility would be NO_x, SO_2, and particulates. Dispersion of these emissions would be assisted by use of a 490 foot tall chimney. A Prevention of Significant Deterioration (PSD) review has been conducted for this project. PSD analysis indicated that air quality changes in the surrounding Class II area and at the Chassahowitzka National Wilderness Area (a class I area) approximately 92 kilometers distant would be within allowable PSD increment levels. Based on this analysis, state and federal air quality standards would not be violated. Negligible effects on local air quality would be anticipated. Extensive investigations are currently in progress toward understanding the globally significant acid rain problem. SO_2 and NO_x emissions from Unit 4 would potentially contribute to this phenomenon. The long term effect on acid rain production is unknown.

No impacts to wetlands, threatened/endangered species, significant historical/archaeological sites, or agricultural lands would occur as a result of Big Bend 4.

Operation of Unit 4 would generate considerable residual wastes that would require disposal. The proposed onsite landfill that may be utilized represents a long-term commitment of this land and reduces the potential future uses of the land.

Operational impacts on the socioeconomics of the area are generally considered minor. Operation of Unit 4 would generate 50 permanent positions in the community. The direct economic effects would yield approximately $1,400,000 in annual payroll. The proposed facility is compatible with current area land-use plans. The existing public, medical, recreational, and cultural facilities within the surrounding areas would not be impacted by this facility. No significant noise impacts would be anticipated.

5. Draft Environmental Impact Statement Comments

A Draft Environmental Impact Statement (EIS) was made available to the Council of Environmental Quality (CEQ) and the public on July 17, 1981. A public hearing on the Draft EIS was held in Ruskin, Florida on August 19, 1981.

Several comments on the Draft EIS were raised at the public hearing and received during the comment period. Major concerns were expressed in regard to the conservation alternative, acid rain impacts, impacts to the groundwater, thermal & entrainment impacts, variances to water quality standards, air quality impacts, and impacts to the manatee. The comments are addressed in Chapter 4 to the Final EIS, "Public Participation."

6. Agency Decision

The Big Bend Unit 4 Draft EIS examined the electric generating strategy proposed by Tampa Electric Company (TECO) and the associated environmental impacts. The Draft EIS also examined alternatives relative to electric generating management, siting, fuel source, heat dissipation, air emissions control, and residual waste disposal.

Pursuant to provisions of the Clean Water Act of 1977, EPA proposes to issue an NPDES permit to Tampa Electric Company for Big Bend Unit 4. The decision to issue the NPDES permit is based upon EPA's review of the project and the associated environmental implications. EPA considered, in the decision process, the comments raised on the Draft EIS and related studies by other Federal and State agencies, interest groups, and concerned citizens. Lastly, no environmental issues have been identified or raised in the NEPA process that would necessitate denial of the NPDES permit.

Several measures which would serve to mitigate the impacts of the proposed project on the surrounding environment were identified during the environmental review process. These measures have been made conditions of the NPDES permit and are outlined below:

- Implement an erosion control and sedimentation program during construction to reduce potential water quality degradation from soil laden runoff.

- Implement a groundwater monitoring program during operation to determine whether leachate is contaminating the groundwater regime and whether more stringent waste disposal measures are needed.

- Leave undisturbed the mangrove swamp system located along the southwestern coastal portion of the site.

- Install the fine mesh screens on Units 3 and 4 prior to Unit 4 pump testing.

- Implement a biological monitoring program to verify the efficiency of the full-scale fine mesh screen system and organism return mechanism.

- Close the discharge canal boatramp from November 15 to March 30 to mitigate potential impacts to the West Indian manatee (an endangered species) which, because of heated effluents, is a temporary resident of the discharge canal during the winter .

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

February 5, 1982

All Citizens, Public Groups, and Governmental Agencies

The Final Environmental Impact Statement (EIS) for Tampa Electric Company's proposed Big Bend Unit 4 located near the city of Ruskin in Hillsborough County, Florida, will be made available to the EPA Office of Federal Activities and to the public on or about February 5, 1982. This document has been prepared pursuant to Section 102(2)(c) of the National Environmental Policy Act of 1969 (NEPA) and the applicable Council on Environmental Quality and EPA regulations (40 CFR 1500-1508 and 40 CFR 6, respectively). A copy of the proposed National Pollutant Discharge Elimination System (NPDES) Permit, NPDES Number FL 0037044, is included in the Final EIS.

The Draft EIS on the proposed project was made available for public review and comment on July 17, 1981. A public hearing on the proposed project was conducted on August 19, 1981, in Ruskin, Florida.

Copies of the Final EIS are available for review at the following locations:

St. Petersburg Public Library 3745 9th Avenue, North	St. Petersburg
St. Petersburg Municipal Reference Library 175 5th Street, North	St. Petersburg
Tampa-Hillsborough County Public Library 900 North Ashley	Tampa
University of Tampa 401 W. Kennedy Boulevard	Tampa
Manatee County Library System 417 12th Street, West	Bradenton
Bradenton Public Library 1405 Fourth Avenue, West	Bradenton

Clearwater Public Library 100 North Osceola Avenue	Clearwater
St. Petersburg Junior College 6605 Fifth Avenue North	St. Petersburg
Sarasota Public Library 701 Plaza de Santo Domingo	Sarasota
Hillsborough Community College Palm and 15th Street	Tampa
University of South Florida 4204 East Fowler Avenue	Tampa
University of South Florida (Bay Campus) 830 First Street, South	Tampa

Comments on the Final EIS may be submitted in writing to:

John E. Hagan III, P.E.
Acting Chief, Environmental Assessment Branch
U.S. Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Any comments received by March 15, 1982, will be considered in EPA's Record of Decision on the project.

Please bring the forgoing to the attention of persons who you know will be interested in this matter.

Chapter 1
SUMMARY OF DRAFT ENVIRONMENTAL IMPACT STATEMENT

1.1 PURPOSE AND NEED FOR ACTION

1.1.1 NEED FOR ACTION

The action as defined for this document is EPA's issuance of a National Pollutant Discharge Elimination System (NPDES) permit to Tampa Electric Company for the proposed Big Bend Unit 4.

Under provisions of the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (33 U.S.C. 1251 et seq.), the Tampa Electric Company has applied to the United States Environmental Protection Agency (EPA) for an NPDES permit for the proposed power plant. In compliance with its responsibility under the National Environmental Policy Act (NEPA) of 1969, the EPA has determined that the issuance of an NPDES permit for the proposed project would constitute a major Federal action significantly affecting the quality of the human environment and is subject to the provisions of NEPA. Prior to a decision on and issuance of the permit, Council of Environmental Quality (CEQ) and EPA procedures for implementing NEPA (40 CFR 1500-1508 and 40 CFR 6, respectively) require an environmental impact statement that identifies impacts of the proposed action and alternatives on the natural and human environments.

The draft environmental impact statement (DEIS) and draft NPDES permit have been prepared to provide Federal, State, and local agencies and the concerned public with sufficient and comprehensible information on the proposed project, the alternatives to the project, and the EPA's proposed action.

1.1.2 IDENTIFICATION OF THE APPLICANT

The Applicant is the Tampa Electric Company (TECO), with headquarters at 702 North Franklin Street, Tampa, Florida. The company is principally engaged in the generation and sale of electricity. The Applicant is a member of the Florida Electric Power Coordinating Group (FCG) and actively participates in the coordination, planning, and operation of the Peninsular Florida Electric System.

TECO serves an area of nearly 1900 square miles on the central west coast of Florida, including all of Hillsborough County and parts of Pasco, Pinellas, and Polk Counties. TECO serves approximately 316,000 customers; TECO's service area is shown in Figure 1-1.

TECO produces electricity in three wholly owned power plants located on or near the eastern shores of Tampa Bay. The units in these plants have a generation capability mix of approximately 65 percent coal, 29 percent No. 6 low-sulfur oil, and 6 percent No. 2 low-sulfur oil. The energy produced from these plants has a generation mix of approximately 80 percent coal, 19 percent No. 6 fuel oil, and 1 percent No. 2 low-sulfur oil.

Hookers Point Station is the oldest of TECO's three power plants. It is located just southeast of the Tampa business district on Hookers Point, fronting the Seddon Ship Channel.

Gannon Station is 6 miles south of Tampa. The six units at this site originally burned coal. To comply with environmental requirements, the first four units were converted to No. 6 low-sulfur oil in 1975 and 1976. Units 5 and 6 burn low-sulfur coal. An additional 14-megawatt gas turbine, which burns No. 2 low-sulfur oil, is also located at Gannon Station. The Applicant plans to convert the first four units back to coal beginning in 1983.

Big Bend, located 10 miles south of Tampa, is TECO's newest power plant. The three existing units burn coal. One 14-megawatt and two 65-megawatt gas turbines, which burn No. 2 low-sulfur oil, are located just north of Big Bend Station.

Presently, TECO's three power plants have a total net generating capability of 2495 megawatts.

1.1.3 NEED AND PURPOSE FOR BIG BEND UNIT

The Applicant's charter is to provide electric power reliably, at a reasonable price, and to maintain the system in a manner consistent with those objectives. The proposed facility is not intended for other purposes, such as the production of steam for resale.

TECO is an active participant in the FCG as well as the FCG System Planning Committee. The 1979 Annual Peninsular Florida Generation Reliability Study indicates that, for the period of 1979 through 1988, the loss-of-load probability for peninsular Florida will range from 0.03 day per year (1979) to 0.18 day per year (1988), compared to the desired value of 0.1 day per year. This estimate includes currently planned additions.

Based on the projected load growth, the net summer and winter peak demands are forecast to increase by about 64 and 86 megawatts per year, respectively, averaged over the period 1981-1989. This need can best be met by (1) the addition of Big Bend Unit 4 to existing baseload capacity in 1985, (2) the realization of a projected joint generating facility in 1989, and (3) provisional power purchases.

A unit power contract involving Big Bend Unit 4 has been negotiated between TECO and another utility for the period 1985 through 1987. The other utility will receive shares of Unit 4 generating capacity according to the following schedule established by TECO: approximately 70 percent in 1985, 50 percent in 1986, and 25 percent in 1987.

TECO has an obligation to contribute its fair share of the generating additions to maintain the reliability of the peninsular Florida system. Major objectives are to maximize the benefits of joint operation, to minimize the effects of generation outages associated with the functioning of a large electric-power-supply system, and to contribute a fair share to the ensurance of system reliability. TECO's fair share is determined through an evaluation of its reliance upon the peninsular Florida generation and interconnection system. According to TECO's site certification application, the 1978-1979 total system winter peak demand for TECO is 10.5 percent of the total system peak of peninsular Florida.

Table 1-1 shows the effect on TECO's system reserves of postponement of the in-service date of Big Bend Unit 4; the firm-load winter reserves for 1985-1986 would drop to 9 percent from the projected 26 percent.

Findings of the Florida Public Service Commission (FPSC) indicate that the achievement of energy-conservation goals would make the addition of the Big Bend Unit 4 to the peninsular Florida system unnecessary. If the goals are not achieved, additional generating capacity may be required. The FPSC has stated, however, that additional capacity will be needed in the TECO service area despite attainment by the utility of its conservation goals. The FPSC has further stated that delay in constructing Big Bend Unit 4 could jeopardize future service to TECO customers.

Alternatives to this project (e.g., purchase of power and the reactivating and uprating of units) are discussed in Section 1.2.

A further consideration in the need for Big Bend Unit 4 is the displacement of foreign oil for the generation of electricity. Based on evidence presented during the need for power proceedings, the FPSC order indicated that operation of Big Bend Unit 4 would contribute approximately $232 million (1980 dollars) toward reducing Florida's dependence on foreign oil.

Table 1-1. Ten-year forecasts of capacity and demand during summer and winter peaks for Tampa Electric Company[a]

Year	Peak demand (MW)	Capacity with Big Bend 4			Margin with Big Bend 4		Margin without Big Bend 4	
		Total installed capacity (MW)	Firm capacity import (MW)	Total available capacity (MW)	MW	Percent of peak	MW	Percent of peak
				Summer forecast				
1980	1860	2495	--	2495	635	34	--	--
1981	1920	2520	--	2520	600	31	--	--
1982	1984	2520	--	2520	536	27	--	--
1983	2064	2520	350	2870	806	39	--	--
1984	2124	2520	350	2870	746	35	--	--
1985	2188	2937	58	2995	807	37	390	18
1986	2247	2937	142	3079	832	37	415	18
1987	2309	2937	246	3183	878	38	457	20
1988	2372	2937	350	3287	915	39	498	21
1989	2439	3337	--	3337	898	37	481	20
				Winter forecast				
1980-81	2047	2495	--	2495	448	22	--	--
1981-82	2122	2520	--	2520	398	19	--	--
1982-83	2199	2520	--	2520	321	15	--	--
1983-84	2284	2520	350	2870	586	26	--	--
1984-85	2362	2520	350	2870	508	22	--	--
1985-86	2448	2937	142	3079	631	26	214	9
1986-87	2537	2937	246	3183	646	25	229	9
1987-88	2630	2937	350	3287	657	25	240	9
1988-89	2726	2937	350	3287	561	21	144	5
1989-90	2825	3337	--	3337	512	18	95	3

Abbreviation: MW = megawatts.

[a] Status as of December 31, 1979.

Note: Capacity changes must be made by November 30 to be considered in effect at the time of the winter peak. All megawatt values are net megawatts.

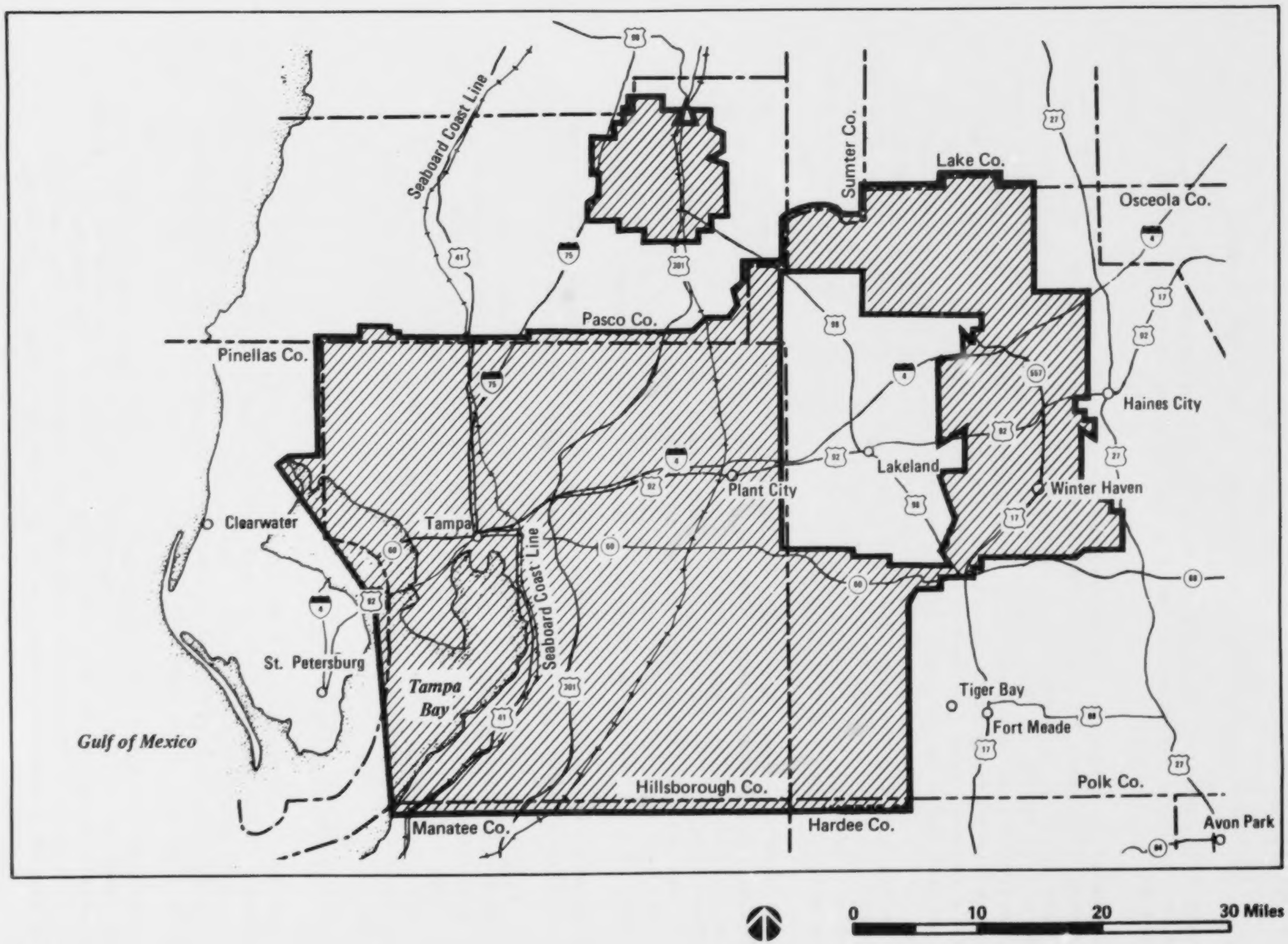
Seaboard Coast Line
Sumter Co.
Lake Co.
Osceola Co.
Pasco Co.
Pinellas Co.
Haines City
Lakeland
Plant City
Winter Haven
Clearwater
Tampa
Seaboard Coast Line
St. Petersburg
Tampa Bay
Gulf of Mexico
Tiger Bay
Fort Meade
Polk Co.
Hillsborough Co.
Avon Park
Manatee Co.
Hardee Co.
98
41
75
301
27
4
17
92
557
60
98
0
10
20
30 Miles

Figure 1–1. Service area, Tampa Electric Company.

1.2 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

1.2.1 NO-ACTION ALTERNATIVE (Non-issuance of the NPDES Permit)

Information needed to evaluate the no-action alternative to the proposed project has been presented in the discussion of the need for action (Section 1.1).

The number of customers relying on TECO for electric power is projected to increase from about 316,000 in 1980 to about 429,000 in 1990. Total sales are projected to increase from 10,141 gigawatt-hours in 1979 to 11,891 in 1985 and to 12,980 in 1989. While industrial consumption is currently about 23 percent higher than residential consumption (1979), the difference is expected to decrease to 18 percent by 1985 and to only 10 percent by 1989. TECO's reserve, with Big Bend 4 operating, is projected to be in the 20 to 25 percent range in the late 1980s. Without this unit, the reserve would drop to 3 to 9 percent despite the importation of several hundred megawatts of capacity during the same time span (Table 1-1). The guideline for reserve capacity is usually about 25 to 30 percent for an individual system such as TECO's. The expected consequence of the lowered reserve capacity is the loss of a reliable supply of electric power.

Should TECO experience a capacity deficiency, it would implement a plan of priority assignments to reduce the load and ensure system stability. This is a short-term plan, however, and cannot be relied on in lieu of long-term system planning. The plan, beginning with curtailment of the interruptible load, has frequently been implemented in varying degrees. The latter phases of the plan, involving curtailment of firm load, have been required only on very rare occasions, as on January 18, 1977, when it snowed in Tampa.

Should an NPDES permit not be issued, TECO could investigate possibilities for purchasing power from other utilities to meet projected capacity needs.

The consequences of no action would be mainly socioeconomic. The lack of reliable power supplies might, for example, discourage the development of the economic sectors needed to support the rapidly growing population, thus affecting the availability of employment in the area. As for the physical environment, there would be no additional impacts on local air, land, or water resources other than those attributable to the operation of Units 1, 2, and 3.

1.2.2 MANAGEMENT ALTERNATIVES

Several other alternatives to the construction of Big Bend Unit 4 have been examined. These alternatives include the purchase of power from other utilities, joint projects with adjacent facilities, the uprating of older generating units, the reactivation of retired facilities, the construction of a smaller facility, and conservation.

The purchase of power--assuming it were available--from other Florida utilities would be the same as the no-action alternative, considering its potential effect on the availability of energy in Florida. The purchase of power from outside Florida--if adequate transmission facilities existed--would provide a temporary solution to the need for power by the State.

While the purchase of power can be a short-term solution, it is becoming more difficult to obtain the necessary approval for the construction of additional capacity for long-term sales to other utilities. The Applicant has not actively pursued long-term power purchases outside Florida because of questions relating to the transmission line/intertie capability to sustain long-term loads.

TECO is pursuing joint ownership for future generation expansion. To meet future baseload requirements, coal and nuclear power will continue to be reviewed to determine the most economical and feasible means of generation expansion. By using economy of scale, two or more utilities may benefit from joint ownership. Several jointly owned units are currently planned by other Florida utilities for online service in the mid-1980s. TECO presently has three full interchange agreements with the Florida Power and Light Company, the Florida Power Corporation, and the City of Lakeland. TECO also has economy interchange agreements with the Fort Pierce Utilities Authority, the Orlando Utilities Commission, and Vero Beach Municipal Utilities, and will participate in other economy interchange transactions whenever practical and possible. TECO has negotiated a contract with Florida Power and Light Company for the sale of power from Big Bend Unit 4 on a decreasing annual basis for the first 3 years of operation.

The Florida Public Service Commission, pursuant to the Florida Power Plant Siting Act (Florida Statutes, Chapter 403), prepared a final report to the Florida Department of Environmental Regulation as to the present and future need for the proposed Big Bend Unit 4. In its deliberations on the issue of need, the Commission took into consideration the conservation goals for Florida electric power utilities established by its Order 9634, issued on November 13, 1980. The Commission concluded that, if its conservation goals are achieved, Big Bend Unit 4 may not be needed from the standpoint of the peninsular system's capacity. However, the Commission also concluded that it appears that the proposed unit is needed for TECO's system, whether or not TECO achieves the conservation goals allocated to it by the Commission.

While the uprating of older units can be a solution to a utility's capacity needs, this is generally true only for larger utilities, where the necessary increase in capacity is only a small fraction of the entire system's capability. This is not the case for TECO. TECO will require approximately 15 percent in additional capacity during the mid-1980s, and it is not possible to uprate the existing units to achieve this additional capacity. In addition, TECO will not be derating any units that could be retained online.

TECO does not have any retired units that could be activated as an alternative to Big Bend Unit 4, and it does not plan on any retirements during the time span of concern.

TECO has considered a reduction in size of the planned coal-fired unit and, alternatively, the construction of a smaller unit such as a gas turbine. While a smaller unit can be constructed more quickly, the cost per megawatt is usually very high. The availability of alternative oil or gas fuels is also a questionable factor. An additional consideration is the new-source performance standard of the EPA, which requires the scrubbing of all new boiler emissions and documentation of the historical performance of flue-gas-scrubbing equipment. Excess flue-gas-scrubber capacity may be necessary to maintain the baseload capability of the proposed generating unit in the event of a scrubber malfunction requiring shutdown for maintenance. The additional scrubber costs may have a smaller per-unit energy impact in larger plants.

1.2.3 POWER GENERATION ALTERNATIVES

In evaluating alternatives, coal was determined to be the most feasible energy source. Other potential sources considered were nuclear fission, oil, natural gas, municipal solid waste, solar-thermal power, wind, and biomass.

Coal is the most feasible energy alternative for Unit 4 for several reasons. Three coal-fired electricity-generating units are presently operating at the Big Bend site. Thus, coal-handling and transportation facilities are already in place and will require minimal expansion to accommodate the new unit. Finally, the Applicant has established an adequate supply of coal for the next 10 years. The most obvious disadvantage of this fuel is that all new coal-fired boilers will require flue-gas cleaning to reduce emissions. The introduction of cleaning equipment at other facilities has resulted in reduced reliability, problems in solid-waste disposal, and increased capital and operating costs.

The lead time required for the licensing, design, and construction of a nuclear-fuel-generating facility is presently close to 10 years. As a result of the Three Mile Island incident, the schedule for the licensing of proposed new units is largely conjectural. The proximity of Big Bend to the more populated areas of Hillsborough County also militates against locating a nuclear plant at that site. Furthermore, the cooling-water requirements of nuclear power plants are considerably greater than those of coal-fired units. For these reasons, nuclear fuel is not considered a feasible alternative for Unit 4.

The Power Plant and Industrial Fuel Use Act of 1978 (PL 95-620) generally prohibits the use of residual fuel oil and natural gas as boiler fuels in baseload-generating facilities, and the U.S. Department of Energy is encouraging the conversion of existing units to coal use. Thus, oil and natural gas cannot reasonably be considered for use in new, large-scale electricity-generating facilities.

Several other alternative energy sources were considered for power generation, but none were deemed feasible for fulfilling TECO's requirements. The use of municipal solid waste as an alternative energy source is limited by stringent air quality standards and by the lack of a viable collection and preparation system. There are too many unknown factors related to the technical and economic feasibility and the environmental impacts of solar-thermal power production for this approach to be considered a reasonable alternative to the proposed generating facility. Likewise, the use of windpower for conventional baseload-generating facilities has not been adequately demonstrated. Several methods of producing fuel from biomass are currently being tested with a view to making use in the future of the large quantities of municipal and agricultural organic wastes available.

1.2.4 SITE ALTERNATIVES

The site-selection process for Big Bend Unit 4 consisted of three stages. In the first stage, area-wide screening for general environmental suitability was conducted. The purpose was to identify favorable and restricted areas in Hillsborough, Polk, Pasco, Pinellas, Manatee, and Hardee Counties. The favorable areas were then screened for conformity with certain requirements, and 13 candidate sites were identified. In the second stage, the candidate sites were evaluated and ranked for suitability according to the environmental criteria and the site requirements. This analysis identified the three most favorable sites. The third stage consisted of three phases: (1) a sensitivity analysis of the evaluation methods to determine how possible changes in the subjective evaluations would affect the recommendation of the most favorable site; (2) a detailed engineering cost analysis to establish a ranking of the three prime sites; and (3) a detailed licensability analysis of the most favorable site to verify the existence or nonexistence of fatal flaws.

The siting analysis indicates that, of the three most favorable sites, Site 8A (Big Bend) is significantly more suitable than the other sites. Sites 7 (Peace Creek), 2 (Highland), and 3A (Strip Mine) were the most suitable alternatives. Figure 1-2 shows the 13 sites identified following the first stage of the analysis.

A sensitivity analysis was performed to determine the effects of variations in input data on the site-suitability scores and on the overall rankings. The results of this analysis show that Big Bend is the preferred site, with Peace Creek and Highland ranked second and third, respectively.

A detailed analysis was also performed to determine the costs of constructing and operating power plants at each of the preferred sites. Estimates of capital costs, recurrent (annual) costs, and total annual costs above the base case were developed. This cost analysis indicated that Big Bend is the preferred site for the proposed facility.

The Big Bend site is also preferred on grounds of water availability. At the most suitable alternative sites, Peace Creek and Highland, only limited amounts of water are available.

In addition to best meeting the various criteria of the siting study, the Big Bend site has two other important advantages: it is closest to the major population centers to be served by the new unit, and it is part of a site already committed to power generation. The construction of Unit 4 at Big Bend would thus entail very little disturbance of previously undisturbed environmental areas.

1.2.5 APPLICANT'S PROPOSED PROJECT

TECO is proposing to expand the existing three-unit, coal-fired electricity-generating facilities at Big Bend Station with the addition of a fourth coal-fired unit. The site of the proposed unit is an area of 521 acres of dredged fill land and 558 acres of upland on the southeastern shore of Hillsborough

Bay, a part of Tampa Bay. The site is approximately 5 miles north of the town of Ruskin (Figure 1-3) and occupies approximately 1675 acres, of which 800 acres are presently in use.

Big Bend Unit 4 will have a net capacity of 417 megawatts, giving Big Bend Station a net generating capacity of 1503 megawatts. The commercial operation of Unit 4 is scheduled for March 1985.

The site plan, which includes the proposed additions for Unit 4, is presented in Figure 1-4. The unit is designed to share certain structures and facilities with the existing units, including transmission towers, coal unloading and handling equipment, and a wastewater-treatment system. The turbine room and boiler complex will be an extension of existing structures. Combustion gases will be exhausted via the stack for Unit 3, which was designed to accommodate two units.

Main plant structures will occupy approximately 7 acres, the coal reserve and service facilities approximately 7 acres, the ash-settling pond system approximately 121 acres, and the FGD byproduct storage and disposal area approximately 97 acres. An existing percolation and evaporation waste-water pond with a spray-irrigation field occupies approximately 40 acres and will not require enlargement.

It is proposed that Unit 4 utilize a once-through condenser cooling system with makeup from Hillsborough Bay. The system will be similar to that presently used for Units 1, 2, and 3, except that the intake will be equipped with fine-mesh screens (aperture: 0.5 millimeter) to reduce the entrainment and impingement of marine organisms. Operation of Unit 4 will require approximately 347 million gallons of cooling water per day and will increase the total cooling-water requirements of Big Bend Station to 1388 million gallons per day. The maximum design water temperature rise with Unit 4 operating will be 16.8°F.

Unit 4 will burn approximately 950,000 tons of medium-sulfur bituminous coal per year. The coal will be delivered by the existing transport methods (covered barges) and will be handled by the existing facilities. The existing coal-storage field will be modified to accommodate the additional coal to be stored for use in Unit 4.

The freshwater needs of the present facility amount to an average of 1.1 million gallons per day, which is supplied from the South/Central Hillsborough County water system. The operation of Unit 4 will require an additional 2.1 million gallons per day from this source. The plant water balance for the proposed unit is shown in Figure 1-5 and itemized in Table 1-2. The FGD system will use most (1.1 million gallons per day) of this freshwater, and most of the remainder will be used in the bottom-ash system (0.5 million gallons per day) and in the fly-ash, economizer-ash, and pyrites sluicing systems (0.05 million gallons per day).

The existing plant wastewater-treatment system consists of an in-plant collection and transportation system, wastewater-treatment ponds, and spray-irrigation or recycling systems. This wastewater system will receive the following wastes associated with operation of Unit 4: all freshwater inplant waste streams; blowdown from the fly-ash, economizer-ash, and pyrites sluicing systems; sanitary wastes; and runoff from the coal storage pile. These wastes will be collected and transported to retention and treatment ponds and then, after treatment, will be recycled for plant use or disposed of by spraying on land.

Liquid wastes from Unit 4 that will be discharged into Tampa Bay waters include condenser biocide additions, boiler blowdown, blowdown from the bottom-ash sluice system, and treated chloride bleed from the FGD system, all of which will be discharged into the discharge canal via the circulating-water discharge line, as well as roof and yard drainage, which will discharge into the intake and discharge canals.

It is estimated that solid-waste generation resulting from Unit 4 operation will total approximately 357,380 tons per year. Bottom ash, pyrites removed from the coal before combustion, economizer ash, and fly ash will be collected and sluiced to settling ponds; subsequently, the dewatered waste material will be disposed of in onsite disposal cells. Fly ash will be available for sale as future markets allow. High-quality gypsum (calcium sulfate) generated as byproduct of the operation of the Unit 4 FGD system will be handled and stored on the site. The storage of this gypsum will be either short- or long-term, depending on its marketability. Permanent disposal will include onsite land-filling of the residual material.

Coal pretreatment, boiler design features, and air-pollution-control devices will combine to ensure that the operation of the proposed unit complies with applicable air quality regulations. Particulate matter will be controlled with an electrostatic precipitator, which will be installed at the exit of the air preheater. Sulfur dioxide emissions will be minimized by a combination of procedures, including coal washing and tail-gas scrubbing in an FGD system. The formation of nitrogen oxides and carbon monoxide during combustion will be inhibited by the design and proper operation of the proposed boiler, furnace, and combustion air control system and by the operating procedures for this equipment.

The expansion of transmission facilities to accommodate Unit 4 will be limited to the installation of a new transmission circuit, which will use the existing towers and transmission routes. The addition of the circuit will not require additional land, additional clearing of vegetation, or changes in topography.

1.2.6 ALTERNATIVE PLANT SYSTEMS

1.2.6.1 Waste-Heat-Rejection Systems

One of the more critical decisions with respect to minimizing the potential environmental impacts of Unit 4 is the selection of the waste-heat-rejection system. There are two types of systems that are feasible for application in the present project: once-through cooling and closed-cycle cooling (cooling towers). Several different design alternatives of each type of system were examined carefully from the point of view of impacts on the site and its environs. Table 1-3 is a comparison of the principal potential impacts of each major alternative considered.

TECO originally proposed that Big Bend Unit 4 use a once-through cooling system with conventional intake screens. After reviewing TECO's Section 316

Demonstration, the EPA concluded that the entrainment and impingement losses for Units 1-4 are potentially adverse. The EPA determined that the use of fine-mesh screens for Big Bend Units 3 and 4 would limit entrainment effects to approximately the current impacts of Units 1, 2, and 3.

Once-Through Cooling with Fine-Mesh Screens on Units 3 and 4, No Dilution (Applicant's Proposed System)

By this alternative, Unit 4 will have a once-through cooling system, and a fine-mesh screen (aperture: 0.5 millimeter) will surround the 9.5 millimeter (3/8-inch) mesh traveling screens of Units 3 and 4. Unit 4 will have a condenser independent of Units 1, 2, and 3, and it will be cooled by water withdrawn from Hillsborough Bay via the existing intake channel. The intake structure will be in common with Unit 3. Figure 1-6 illustrates the cooling water system of the existing three units and that proposed for Unit 4.

After passing through the Unit 4 condenser, the water will exit (NPDES Serial No. 008) to the existing discharge channel and combine with water discharged from Units 1, 2, and 3 (NPDES Serial Nos. 001, 003, and 004). The mixture will flow westerly, returning to Hillsborough Bay.

Unit 4 will draw approximately 537 cubic feet per second of circulating water from the existing intake channel. Approach velocities to the 0.5-millimeter-mesh screens will be about 0.5 foot per second. The average water velocity immediately in front of the 9.5-millimeter screenwell will be about 1.45 feet per second.

As a result of EPA concern regarding the number of organisms entrained at Big Bend Station Units 1, 2, and 3, the Applicant initiated a multiphase evaluation of alternative intake technologies to identify potential design alternatives for the Unit 4 intake structure. The results of this evaluation indicated that a fine-mesh screening system (specifically, a modified, dual-flow traveling screen) could reduce the loss of entrained organisms at Big Bend Station. Consequently, more detailed studies to further evaluate the fine-mesh-screen concept were conducted during 1980.

The test results show that a fine-mesh screen system could reduce the entrainment losses at Big Bend by returning viable meroplankton organisms to the bay system. As a basis for ecological and engineering evaluations of the potential effectiveness of fine-mesh screening at Big Bend Station, a conceptual design for such a system was developed. The number and size of the fine-mesh screens have been preliminarily determined on the basis of a standard screen-face velocity (approach velocity) of 0.5 foot per second at 0.0 mean low water. Low- and high-pressure sprays (5 to 10 pounds per square inch and 40 to 60 pounds per square inch, respectively) will wash organisms and debris into separate troughs.

All troughs will manifold into a common sluiceway, and the combined flow will pass through a debris trap and a 4-inch-mesh screen. The flow will carry organisms and debris to a release point north of the intake channel via an

18-inch pipe. The organism-return pipe will be sized to achieve a transport velocity of less than 5 feet per second. The length of the return flume will range from 1500 to 4700 feet, depending on the exact routing and location of discharge.*

As a part of the conceptual design evaluation, cost estimates were developed for installing fine-mesh screens at Big Bend Units 3 and 4. Costs were also estimated for a duplicate system that could be installed on Units 1 and 2 if further reduction in entrainment were required. The cost of the organism-return pipe, which would be shared by all four units if equipped with fine-mesh screens, was included only in the cost for Units 3 and 4. These costs were compared to the differential costs (costs over and above the costs of a conventional once-through system) of a closed-cycle cooling system. Table 1-4 provides a summary of this cost comparison.

In the once-through cooling system, pipes from the Unit 4 condenser will connect to a 9-foot-diameter pipe leading the water to the discharge structure. The Unit 4 discharge structure will resemble those for Units 1, 2, and 3. The warm circulating water from Unit 4 will also exit to the discharge channel. Flow from the Unit 4 discharge structure will combine with the discharge water from the three existing units and move westerly through the channel to the point of discharge to Tampa Bay.

Big Bend Units 1, 2, and 3 are equipped with one chlorinator, to which Unit 4 will be connected. Liquid chlorine will be fed to the Unit 4 cooling water at a similar rate and in the same manner that it is being fed to the existing units. Only one unit at a time will be chlorinated. It is currently proposed that total residual oxidant (TRO) levels at the discharge be limited to 0.2 milligram per liter.

The use of a fine-mesh screening system on the intakes of Units 3 and 4 will limit organism entrainment to approximately the rates presently occurring with the use of conventional 9.5-millimeter (3/8-inch) mesh screens on Units 1-3 without thermal-dilution cooling. Organisms removed from the cooling water by the fine-mesh screens will not experience the effects of passage through the condenser-cooling system, but instead will be exposed to the effects of impingement on the screen and subsequent return, via a sluiceway, to local waters.

Once-Through Cooling with Fine-Mesh Screens on Units 1-4, No Dilution

This alternative consists of equipping existing Units 1, 2, and 3 and new Unit 4 with the fine-mesh screen system. However, not all of the potential engineering problems with this alternative have been resolved. With this alternative, organism-entrainment levels would be further reduced below those occurring with a conventional once-through system. Economic costs for this alternative are detailed in Table 1-4.

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*This discussion is summarized from the Draft EIS. See Chapter 3 (Section 3.3) of this FEIS for the most recent analyses.

Once-Through Cooling with Conventional Screens, No Dilution

With this alternative, cooling water for Unit 4 is drawn from the intake channel and passes through a debris fence and conventional (9.5-mm-mesh) traveling screens to the screenwell. From the screenwell it is pumped through the condenser and then flows to the discharge point south of the unit. The design temperature rise of the water passing through the Unit 4 condenser is 16.8°F at 100 percent load.

By this alternative, as opposed to the use of a fine-mesh screen system, entrained organisms would be subjected to the effects of passage through the condenser-cooling system. Moreover, organisms impinged on the screens would not be returned to local waters, but would be disposed of as waste.

The EPA stated in the Finding and Determination for the Section 316 Demonstration for Units 1-4 that TECO's analysis failed to demonstrate that conventional once-through cooling would adequately minimize entrainment impacts. It was also estimated that the addition of a fourth conventional once-through cooling system to the existing facilities could increase the current impingement effects of Units 1, 2, and 3 by approximately 33 percent. The EPA concluded that entrainment and impingement losses for four Big Bend units using conventional screens are potentially adverse.

Once-Through Cooling with Dilution

This option is the same as the once-through alternatives described above, except for the addition of a flow of ambient unheated water into the discharge canal in order to reduce the temperature of the effluent before it enters Hillsborough Bay. Water at ambient temperature is withdrawn by pumps from the intake side of the site and released into the discharge stream.

A dilution system for Units 1-4 could utilize either one or two pumps. With all four units at full load, the dilution effect from one pump would reduce the temperature rise from intake to discharge from about 16.8°F to about 11.8°F. A reduction to about 9.2°F would be achieved with two dilution pumps in operation. Mixing with ambient water would decrease the temperature of the thermal plume in the discharge canal. The overall plume would have a larger areal extent, but the area within the highest isotherms would be smaller, and thus potentially there would be a thermal impact on fewer organisms.

Organism entrainment and its effects would be greater with this alternative than with once-through systems with no dilution because plankton in the dilution water would be exposed to elevated temperatures as this water mixed with the heated effluent in the discharge canal. The increase in the numbers of organisms entrained would be directly proportional to the volume of water used for dilution. The low speed and large clearances within the pump allow fish to pass through with a minimum of injury.

The EPA has stated in the Finding and Determination on the Section 316 Demonstration for Units 1-3 that entrainment levels were unacceptably high when dilution pumping was used in conjunction with the operation of three units at Big Bend.

Closed-Cycle Cooling Systems

TECO commissioned a study to determine the preferred type of closed-cycle heat-rejection system for Big Bend Unit 4. The closed-cycle systems considered in the study were a natural-draft wet-cooling tower and a concrete, circular mechanical-draft wet-cooling tower with multiple fans.

The mechanical-draft cooling-tower system was selected as the preferred closed-cycle system primarily on the basis of economics. The net present value of the capital and performance costs associated with the natural-draft closed-cycle system was estimated to be approximately $22 million more than those of the mechanical-draft system.

The natural-draft tower does not offer any significant environmental advantages that would outweigh its greater cost. The natural-draft tower was judged to be slightly preferable to the mechanical-draft in terms of salt-drift impacts, ground-fogging potential, and noise, but less desirable with respect to aesthetic impacts.

TECO's preferred design for the Big Bend Unit 4 mechanical-draft wet-cooling tower would use saltwater makeup from Tampa Bay. Because the tower cools by evaporating some of the water flowing through, makeup water must be added to replace it. Salt or minerals in the makeup tend to concentrate in the cooling-tower water since evaporation removes only pure water, leaving other constituents behind. To control their concentration, a portion of the water circulating in the tower system is discharged as "blowdown," and the makeup is increased by a corresponding amount. In the case of the Big Bend Unit 4 tower, makeup (from Tampa Bay) would have an average salinity of 28 parts per thousand, and the design salinity in the water circulating in the tower would be 1.5 times that level, or 42 parts per thousand. Makeup water would be taken through a makeup-intake structure located either adjacent to the Unit 3 circulating-water intake or in the discharge canal. Blowdown would be discharged (NPDES Serial No. 008) to the discharge canal.

During operation of the cooling tower, droplets of circulating water (drift) are entrained in the air flowing through the tower and are exhausted in the air stream leaving the top of the tower. The drift contains dissolved solids that are present in the circulating water--primarily salt in the case of Big Bend Unit 4. Drift eventually is deposited on soils, vegetation, structures, etc., with potentially harmful effects. Cooling towers are equipped with drift eliminators, but, while they are capable of substantially reducing drift, they cannot eliminate it altogether.

Important environmental considerations relative to the use of this alternative heat-rejection system include (1) the effects of salt drift on local air, land, and equipment; (2) the increased fogging potential and noise levels; (3) the potential for aesthetic impacts; (4) potential impacts on surface-water quality due to the discharge of tower blowdown; (5) the very small impact of impingement and entrainment; and (6) the small thermal discharge to Hillsborough Bay.

A closed-cycle system for Big Bend Unit 4 will be substantially more expensive than the proposed once-through system. In terms of capital cost, the mechanical-draft system represents an incremental cost of about $26 million at the time of commercial operation. There is also a performance penalty of approximately $1.9 million per year. The net present value of the annual capital and performance costs of the mechanical-draft system is about $6.1 million more than that of the once-through system.

Treated-wastewater was considered as an alternative source of makeup for a mechanical-draft wet-cooling tower for Unit 4. With this alternative, the reduced content of dissolved solids in the wastewater would allow for a higher concentration factor (ratio of solids in the circulating water to solids in the makeup water) and higher drift rates. Blowdown could be reduced by about 10 times. Less elaborate and hence less costly drift eliminators would be required. The required makeup rate would be approximately 4300 gallons per minute (approximately 6.2 million gallons per day) with the unit operating at maximum output. There would be no impingement or entrainment of aquatic organisms with this alternative since no water would be withdrawn from Hillsborough Bay.

There is no supply of treated wastewater within several miles of the Big Bend site. Thus, a large pipeline several miles in length would be required to transport the makeup water to the site. The cost of such a pipeline makes this system an expensive alternative.

Other alternative sources of cooling tower makeup water that were considered include brackish and fresh ground water.

Preliminary indications are that brackish makeup water that meets and exceeds quality, quantity, and environmental requirements can probably be supplied from an approximate depth of 2000 to 3000 feet. If the need for a brackish water cooling-tower makeup source is indicated, an additional study program will be required. This program would consist of (1) the development of a computer model to simulate well-field and aquifer responses for the 35-year life of the station and (2) a field-testing program that will include the construction of a production test well and several test wells. On completion of this study, conclusions can be drawn as to the feasibility of using the brackish-water source, and the environmental effects of pumping the aquifer can be predicted.

Freshwater resources in the Big Bend area are limited to ground water that is used for agricultural activities. The quantities of water needed as makeup for a closed-cycle system would place a great burden on the local ground-water resources. For this reason, investigative efforts have concentrated on finding a feasible source of sewage effluent.

1.2.6.2 Wastewater Treatment and Disposal Alternatives

The liquid wastes generated by the operation of Big Bend Unit 4 will consist of the following:

- Water-treatment and condensate-polisher wastes
- Wastes from equipment washing and boiler chemical cleaning
- Floor and equipment drainage
- Boiler blowdown
- Blowdown from the service-water cooling-tower system
- Blowdown from the bottom-ash-sluice system

- Wastes from fly-ash, economizer-ash, and pyrites sluicing
- FGD system chloride bleed stream
- Runoff from the coal-storage pile
- Sanitary wastes

All of these wastes are freshwater wastes. Unlike Units 1, 2, and 3, Unit 4 will not generate any saltwater waste streams.

Big Bend Unit 4 will use three separate systems for the treatment and disposal of liquid wastes: a wastewater-treatment system, a sewage-treatment plant for sanitary wastes, and a system for treating the FGD chloride bleed stream.

A wastewater-treatment system was installed at Big Bend during 1976 and 1977 to comply with the provisions of the NPDES permit issued by the EPA on March 31, 1976. The system now serves Units 1, 2, and 3 but is of adequate capacity to receive the wastes from the proposed Unit 4.

This system will be used for all in-plant waste streams produced by the proposed Unit 4 other than boiler blowdown, blowdown from the bottom-ash sluice system, and the FGD chloride bleed stream, all of which will be discharged to local surface waters. The wastes destined for the wastewater-treatment system will be captured by the in-plant collection system. This system consists of a network of sumps and piping throughout the plant area that receives wastewater from washing operations, equipment drains, etc., and conveys it to the main transfer sump. The mixture of wastewaters is then conveyed to the wastewater-treatment ponds. Any wastes that are discharged to the wastewater-treatment system will be recycled or disposed of by evaporation/percolation or spray irrigation, with no point-source discharge to waters of the United States.

Wastewater from all station sanitary fixtures is collected and conveyed to an existing package-sewage-treatment plant. This plant, which uses the extended-aeration aerobic-digestion process, was sized to accommodate future enlargements of the station. Effluent from the treatment plant is disinfected with chlorine and then discharged into the plant wastewater-treatment system for ultimate disposal through spray irrigation.

Boiler blowdown (NPDES Serial No. 009) and blowdown from the bottom-ash sluice system (NPDES Serial No. 010) will be discharged, untreated, to the Unit 4 condenser-cooling-water discharge pipe (NPDES Serial No. 008), which will discharge into the station discharge canal.

The FGD-system chloride-bleed stream will be treated for total suspended solids, pH, and oil and grease in a liquid-waste treatment system. After treatment, the flow (NPDES Serial No. 011) will be discharged into the Unit 4 condenser-cooling-water-discharge pipe (NPDES Serial No. 008), which discharges into the station discharge canal. Sludge from the treatment process will be disposed of in the gypsum storage and disposal area.

Two alternative methods of treating the FGD-system chloride-bleed stream, boiler blowdown, and bottom-ash blowdown to meet water-quality criteria before mixing have been evaluated: the use of reverse osmosis and the treatment of the boiler and bottom-ash blowdowns in the treatment system provided for the FGD-chloride-bleed stream.

TECO's analysis indicates that it would not be practicable to use reverse osmosis to treat the indicated waste streams. The boiler and bottom-ash blowdown streams are projected to have total-dissolved-solids concentrations at or below 500 parts per million. These concentrations are considered to be below acceptable levels for the optimum operation of a reverse-osmosis system. In the FGD chloride bleed stream, the total-dissolved-solids concentration is projected to be approximately 108,000 parts per million. The treatment of such a concentration would require reverse-osmosis membranes capable of withstanding pressures in excess of 2000 pounds per square inch, which is beyond the capability of standard reverse-osmosis systems. Moreover, the chemical constituents of the FGD bleed stream could cause scaling of the membrane. Analysis indicates that reverse-osmosis treatment would not produce a measurable improvement in the water quality of the effluent at the point of discharge. Accordingly, TECO believes that the estimated $1.8 million cost of the system would not be justified, since no detectable benefit in water quality would result.

The FGD-bleed-stream-treatment system is designed for the removal of suspended solids and for the adjustment of pH to meet effluent standards. This system would have to be upgraded to handle the flows from all three blowdown streams. The cost for redesigning the system is estimated by TECO at about $1.2 million.

The Applicant states that treatment of the boiler and bottom-ash blowdowns in the FGD-bleed-stream-treatment system is not practicable for the following reasons:

1. Boiler blowdown will be in compliance with effluent limitations.
2. Bottom-ash blowdown will meet effluent limitations, and the pH of the bottom ash will comply with effluent limitations without treatment.

1.2.6.3 Systems for the Control of Atmospheric Pollution

Several alternatives for atmospheric pollution control systems were examined.

Alternatives for the Control of Sulfur Dioxide Emissions

Several systems were considered for the control of sulfur dioxide emissions: lime/limestone-slurry scrubbing with coal washing--the system that is proposed by TECO; the dual-alkali FGD system; the Wellman-Lord process; and a number of as yet unproved techniques, including chemical coal cleaning, coal treatment by solvent refining, fluidized-bed combustion, and the magnesium oxide process.

As proposed, sulfur dioxide emissions from Big Bend Unit 4 will be minimized through a combination of coal washing and tail-gas cleaning using a forced-oxidation, double-loop FGD system. Based on as-mined coal-sulfur content, a 90 percent overall reduction in sulfur dioxide emissions is expected, and this will ensure compliance with the revised new-source performance standard (NSPS). It is further expected that, with raw-coal sulfur levels equal to or more than 3 pounds per million Btu (but no more than 6 pounds per million Btu), the overall sulfur dioxide-removal requirement of 90 percent will be achieved through a combination of approximately 25 percent removal (in terms of pounds per million Btu) in washing, 5 percent retention in the ash from fired sulfur, and 86 percent removal in flue-gas cleaning. As a byproduct of this process, gypsum, suitable for the manufacture of wallboard, will be produced. TECO is planning to market the gypsum for that purpose. An onsite area of approximately 97 acres has been designated for storage and/or disposal of all gypsum.

Using the proposed control system, the sulfur dioxide emissions from Unit 4 will range from 2592 to 5184 pounds per hour as long as the sulfur content of the coal ranges from 3 to 6 pounds, as proposed by TECO. These emissions will be in conformity with the State of Florida ambient-air-quality standards (AAQS).

There are several features of the dual-alkali FGD system that make it economically unattractive for Big Bend Unit 4. The overall cost of reagents for the system is much greater. The reagents are not readily available, and the waste solids produced have a high proportion of calcium sulfite and significant quantities of highly soluble sodium salts in their surface moisture. The waste would probably require stabilization to prevent leaching of the salts at the disposal site and to prevent calcium sulfite from exerting a chemical oxygen demand. Such developments would significantly increase the disposal costs.

The Wellman-Lord process is a regenerable process that produces a marketable end product, either elemental sulfur or sulfuric acid, and thereby minimizes waste disposal. Nevertheless, there are several features of this system that make it unattractive. It is energy intensive, has higher capital and operating costs, high water requirements and energy penalties, a complete plant and a tank-farm facility are required for the production of the byproduct sulfuric acid, and the Applicant must enter into sulfuric acid sales. Preliminary inquiries have revealed little interest in the purchase of such sulfuric acid.

Alternatives for the Control of Particulate Emissions

The alternatives considered for the control of particulate-matter emissions from Big Bend Unit 4 were electrostatic precipitation, which is the system proposed by TECO, and fabric-filter particulate-collection systems.

Emissions of particulate matter from the boiler of Big Bend Unit 4 will be controlled by an electrostatic precipitator (ESP). The collection efficiency will be a minimum of 99.7 percent, and the maximum concentration of total suspended solids emitted by Unit 4 will be 3.7 micrograms per cubic meter. These emissions are below the level of significant impact, conform to the State of Florida AAQS and match the applicable NSPS for electric utility steam-generating units. Like the fly ash from existing Big Bend units, fly ash collected in Unit 4 will be marketed by TECO. Provision will be made for the onsite disposal of fly ash should the market for the ash cease to exist.

Fabric-filter particulate-collection equipment is regarded as the only technically feasible alternative to electrostatic precipitators capable of adequately limiting emissions from Big Bend Unit 4. It has been commercially demonstrated on both utility and industrial boilers and has achieved emission reductions of substantially more than 99 percent.

The selection of an ESP rather than a fabric-filter installation is based primarily on the demonstrated availability and reliability of the ESP at similar facilities firing high-sulfur coals. Moreover, ESPs and baghouses are considered to be capable of comparable particulate-collection efficiencies for boilers firing coals under consideration for Unit 4. Generally, the fabric filter is capable of providing slightly higher removal efficiencies. However, the ESP is much more cost-effective for application with medium- to high-sulfur coal like that to be used at Big Bend Unit 4. In addition, the fabric-filter equipment would operate with a higher energy loss due to gas-pressure drop, and its operating and maintenance costs would be significantly higher for this application.

Alternatives for the Control of Nitrogen Oxide Emissions

Generally, required reductions in nitrogen oxide emissions are possible through alternative combustion techniques, which include water or steam injection; flue-gas recirculation; and over-fire air, also known as two-stage combustion. The proposed combustion-type control technology for nitrogen oxide emissions from the Unit 4 boiler is considered the only available system capable of meeting the NSPS and thus it is the Applicant's proposed system.

The emission of nitrogen oxide from the combustion system will be minimized by the design of the burners and boiler to be provided by the boiler manufacturer, Combustion Engineering, Inc. (CE). The balance-draft boiler with a tangentially fired furnace to be used at Unit 4 has a demonstrated capability of limiting nitrogen oxide formation from the firing of bituminous coal to 0.6 pound per million Btu as nitrogen dioxide. This meets the applicable NSPS. The nitrogen oxide emissions from Unit 4 will be 2598 pounds per hour. The maximum annual nitrogen dioxide concentration will be 0.5 microgram per cubic meter. This is in compliance with the State of Florida AAQS.

Control of Carbon Monoxide Emissions

Carbon monoxide emissions from the Unit 4 boiler will be minimized by operation at excess-air levels sufficient to achieve essentially complete combustion to carbon dioxide and by the appropriate design of the combustion-air control system. This system is judged the best available control technology for carbon monoxide because no alternative means of controlling this pollutant are currently available or under development.

The estimated emissions of carbon monoxide from Unit 4 are 2457 pounds per hour. The maximum 3-hour concentration is predicted to be less than 8 micrograms per cubic meter, which is far below the level of significant impact. The emissions of carbon monoxide are not controlled by Federal or State regulations.

1.2.6.4 Solid Waste Disposal

The operation of the proposed Big Bend Unit 4 will produce several kinds of solid waste: gypsum from the FGD system, pyrites removed from coal before combustion, and ash from coal combustion (Table 1-5). In addition, Unit 4 will generate economizer ash and waste solids from water treatment.

Described below is TECO's proposed solid-waste disposal scheme.

Bottom ash will be collected in a water-filled hopper and sluiced to either of two primary settling ponds formed by earthen dikes. Most of the bottom ash will settle in the primary settling ponds. Once these ponds are filled, the ash will be hydraulically dredged to a final disposal cell developed as the need for disposal volume arises.

At times when it may be impossible to market Unit 4 fly ash, an ash-disposal pond will be used. The solids will be sluiced from the plant to either one of two lined primary settling ponds. When the ponds reach the point at which they must be cleaned, a final earthen-diked disposal cell will be constructed and lined. The ash will be hydraulically dredged to the disposal cell.

Economizer ash and pyrites removed from the coal before combustion will also be disposed of in the fly-ash disposal system.

The waste produced by the FGD system will consist mainly of gypsum, which will be handled and stored in an area south of the Unit 4 ash pond. The gypsum is considered to have greater market potential than any other possible byproduct of an FGD system. It has been successfully used in the production of wallboard, in cement manufacturing as a set retarder, and in agriculture as a soil additive.

TECO has developed a multiphase plan for gypsum storage and disposal. The purpose of this plan is (1) to provide gypsum storage during periods of low gypsum demand and (2) to provide time for the establishment of a long-range plan for the disposal of gypsum should a permanent market fail to materialize. The plans provide for either permanent disposal or short-term storage of gypsum, as required. The use of comparatively small disposal areas will allow good control of rainfall runoff and of housekeeping operations if substantial quantities of gypsum should accumulate.

If substantial gypsum storage proves necessary, a landfill will be created using a heaped-fill configuration. This technique is deemed to be the most adequate in view of the geologic and topographic characteristics of the site. In order to contain the gypsum, berms will be constructed around the entire area. These berms will be designed to withstand a 100-year flood and storm surge. Stormwater falling within the bermed area will be directed to temporary stormwater storage in that area. It will then be allowed to percolate into the ground or evaporate.

Disposal schemes other than that selected for Big Bend Unit 4 include (1) offsite disposal and (2) commercial application without throwaway disposal. The lining of the gypsum storage and disposal area was also evaluated.

For purposes of offsite disposal, the ash and scrubber sludge would have to be transported great distances to either a coal mine, a limestone quarry, a phosphate mine, an impoundment, or a landfill. The cost of such transport is a major deterrent to offsite disposal. The two waste products have significant commercial potential, and for that reason, throwaway disposal may be deemed inappropriate.

The alternative of lining gypsum storage and disposal areas was evaluated in a 20-month study conducted by the Electric Power Research Institute at a power plant in northern Florida. The results of that study indicated that the disposal in an unlined area of gypsum produced by an FGD system similar to that proposed for Big Bend Unit 4 had no substantial adverse impact on the quality of water in the surficial or Floridan aquifers in the vicinity of the disposal site. It is estimated that it would cost $1.1 million to install a flexible, synthetic liner in the gypsum storage and disposal area.

1.2.6.5 Transmission Right-of-Way

One 230-kilovolt circuit with a length of 2970 feet (9/16 mile) will connect Big Bend Unit 4 to the existing Big Bend substation. Electric power generated by the unit will enter the existing TECO transmission system at that point. The new transmission circuit will use existing towers and the existing transmission route between the plant and the substation.

1.2.7 EPA'S ENVIRONMENTALLY PREFERRED ALTERNATIVE AND RECOMMENDED ACTION

From an environmental perspective, not constructing Big Bend Unit 4 would apparently be preferable. Based upon the FPSC's findings, there is apparently sufficient generating capacity available to the Florida peninsular grid so that construction of Big Bend Unit 4 would be unnecessary. However, in order to meet future TECO service area demands TECO would be required to purchase power from other utilities. Because the two major Florida utilities (FPC and FPL) have no available capacity from their certified units, purchase of power from out-of-state utilities would likely be necessary. The FPSC has stated that on the basis of the economics considered this option would not be cost or time effective. Furthermore, the FPSC has stated that substantial socioeconomic benefits could be realized by construction of Unit 4 through displacement of foreign oil.

When the economic findings as stated in the FPSC Order (Appendix G of the DEIS) are considered, other aspects become significant from a permit issuance standpoint.

Based upon the positive need for power findings of the FPSC and EPA's evaluation of the impacts of the proposed project and alternatives, EPA finds the project alternative proposed by TECO to be environmentally acceptable.

The alternative preferred by the EPA is therefore as follows:

Management: Big Bend Unit 4

Fuel: Coal

Site: Big Bend

Waste heat rejection: Once-through cooling with fine-mesh screens on Units 3 and 4 (cooling water to be drawn from Hillsborough Bay)

Air emissions control:

Particulates--electrostatic precipitators

Sulfur dioxide--lime/limestone scrubbing with coal washing

Nitrogen oxide--boiler design

Residual solid waste disposal: Sale of fly ash and gypsum; provisions for onsite storage if necessary

Analyses demonstrate that the ambient levels of several metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead, selenium) in Hillsborough Bay and in the intake canal may violate State of Florida water-quality standards. Consequently, the discharge of certain effluents (boiler, bottom-ash, and FGD blowdowns) from Unit 4 as proposed would violate the water-quality standards. Control systems such as reverse osmosis and the chemical treatment of blowdowns are available to reduce the levels of metals in the effluents. While changes in the ambient water quality resulting from these discharges, treated or untreated, are mathematically predictable, they would be undetectable at the levels projected. TECO has received a variance from the Florida water-quality standards from the Florida Department of Environmental Regulation. The Conditions of Certification approved by the Governor and Cabinet state that TECO will explore the practicability of treating the boiler blowdown in the FGD system treatment system when there is capacity in the system to accomodate that blowdown. EPA considers this to be an acceptable approach to the discharge of plant effluents.

TECO's proposed method for the disposal of fly ash and gypsum is to sell these resources as construction materials. However, should the state of the economy shift, their sale may be impossible and onsite disposal may be required. TECO proposes to dispose of bottom ash at the site. The onsite disposal of these materials will cause leachate to enter the surficial ground water during periods of storm runoff. The fly-ash area will be lined with an impermeable material to prevent leachate contamination. The bottom-ash and gypsum areas will be unlined. Although the EPA considers the lining of these areas to be an environmentally preferable alternative, preliminary studies indicate that the leachability of these materials, particularly the gypsum, will be minimal. One condition of the NPDES permit is the development and implementation of an acceptable ground-water-monitoring program to preclude adverse impacts to the ground-water regime.

The assessment of environmental impacts associated with TECO's proposed project took into account mitigative measures that were not included as part of TECO's project proposal. Specifically EPA recommends that--

1. A ground-water-monitoring program be implemented before operation so that, should any significant contamination of ground water be demonstrated, corrective measures could be instituted to ensure no further significant leaching.

2. An erosion and sedimentation control program be implemented to prevent silt and soil-laden runoff during Unit 4 construction.

3. The mangrove area along the southwestern shoreline of the site be left undisturbed and protected as specified in TECO's proposed project.

4. A program to reduce impacts on the manatee, an endangered species, be implemented as recommended by the U.S. Fish and Wildlife Service

5. Fine-mesh screens for Units 3 and 4 and the organism return system be installed and operational before Unit 4 pump testing.

6. A biological monitoring program be implemented so that the impacts of Unit 4 in conjunction with Units 1-3 on the benthos of the Tampa Bay System and the survivability of organisms during operation of the full-scale fine-mesh-screens and organism return mechanism can be assessed.

The EPA tentatively proposes to issue an NPDES permit to TECO for Big Bend Unit 4. A draft of the proposed permit is presented in Appendix A. The project authorized by the permit is that described as TECO's proposed project in this document. This project will incorporate all measures identified as conditions of the permit (Part III conditions).

Table 1-2. Water use at Big Bend Station (Sheet 1 of 3)
(Thousands of gallons per day)

Line number[a]	Use	Average use	Maximum use	Nature[b]	Duration	Frequency
A	Activated-carbon bed influent	145.2	145.2	C	--	--
B	Activated-carbon bed effluent	144.9	144.9	C	--	--
C	Activated-carbon bed backwash	0.3	0.3	I	--	1 per week
D	Anion/cation bed effluent	115.0	115.0	C	--	--
E	Anion/cation bed backwash	29.9	29.9	I	--	1 every 30 hours
F	Mixed-resin bed effluent (boiler makeup)	114.2	114.2	C	--	--
G	Mixed-resin bed backwash	0.8	0.8	I	--	1 every 27 days
H	Neutralization/equalization effluent backwash	38.7	38.7	C	--	--
I	Condensate-polisher backwash makeup	8.0	8.0	I	--	1 every 4 days
J	Condensate-polisher backwash	8.0	8.0	I	--	1 every 4 days
K	Boiler blowdown	43.2	43.2	C	--	--
L	Boiler chemical cleaning waste	0.9	0.9	I	2 hours per stage	1 every 2 years
M	Vent losses	15.0	15.0	C	--	--
N	Soot-blowing losses	47.1	47.1	I	--	--
O	Service cooling-water makeup	210.0	210.0	C	--	--
P	Service cooling-water evaporation losses	138.0	138.0	C	--	--
Q	Service cooling-tower blowdown	72.0	72.0	C	--	--
R	High- and low-pressure fire protection system	Nil	Nil	I	--	--
S	Domestic service water	1.3	1.3	I	--	--
T	Sewage-treatment plant effluent	1.3	1.3	I	--	--
U	Hose connection	0.1	2.9	I	4 hours	1 every 4 weeks
V	Pump seals	10.8	10.8	C	--	--
W	Clinker/grinder seals	1.3	5.4	I	2 hours	3 per day
X	Coal equipment wash	2.1	2.1	I	16 hours	4 per year
Y	FGD system makeup	1,123.2	1,123.2	C	--	--

Note: See abbreviations and footnotes at end of table.

Table 1-2. Water use at Big Bend Station (Sheet 2 of 3)
(Thousands of gallons per day)

Line number[a]	Use	Average use	Maximum use	Nature[b]	Duration	Frequency
Z	FGD slurry (85% water)	1,741.0	1,741.0	C	--	--
AA	FGD evaporation losses	989.3	989.3	C	--	--
BB	Hydroclone effluent to filter	316.8	316.8	C	--	--
CC	Vacuum-filter sludge (20% water)	74.9	74.9	C	--	--
DD	Vacuum-filter recycle	241.9	241.9	C	--	--
EE	Hydroclone recycle	1,424.4	1,424.4	C	--	--
FF	Recycle to FGD system	1,607.1	1,607.1	C	--	--
GG	FGD system wash	66.6	133.3	I	--	--
HH	Service-water effluent	21.2	21.2	I	--	--
II	Wastewater-treatment system recycle	21.2	21.2	I	--	--
JJ	Air-preheater wash	9.4	9.4	I	8 hours	1 every 3 months
KK	Precipitator wash	5.3	5.3	I	80 hours	3 per year
LL	Economizer wash	0.3	0.3	I	4 hours	3 per year
MM	Sparging system	4.6	4.6	I	24 hours	3 per year
NN	External boiler wash	1.6	1.6	I	24 hours	2 per year
OO	Fly-ash pond blowdown	72.0	72.0	I	--	--
PP	Wastewater-treatment system percolation losses	30.0	30.0	C	--	--
QQ	Spray-irrigation system	169.5	183.4	I	--	--
RR	Construction runoff	0	0	I	--	--
SS	Condenser cooling water	347,072.0	347,072.0	C	--	--
TT	FGD system blowdown	59.0	59.0	C	--	--
UU	Bottom-ash pond makeup	505.0	505.0	C	--	--
VV	Condenser cooling effluent	347,072.0	347,072.0	C	--	--
WW	Coal-storage runoff	--	--	I	--	--
XX	Bottom-ash recycle	1,825.0	1,825.0	C	--	--
YY	Fly-ash sluice-water makeup	72.0	72.0	I	--	--

Note: See abbreviations and footnotes at end of table.

Table 1-2. Water use at Big Bend Station (Sheet 3 of 3)
(Thousands of gallons per day)

Line number[a]	Use	Average use	Maximum use	Nature[b]	Duration	Frequency
AAA	Bottom-ash sluice	2,300.0	2,300.0	I	--	--
BBB	Bottom-ash system evaporation losses	30.0	30.0	C	--	--
CCC	Fly-ash sluice	1,440.0	1,440.0	I	--	--
DDD	Fly-ash recycle	1,368.0	1,368.0	I	--	--
EEE	Bottom-ash pond percolation losses	360.0	360.0	C	--	--
FFF	Bottom-ash pond blowdown	115.0	115.0	C	--	--
GGG	Construction water uses	NA	NA	I	--	--
HHH	Domestic water uses	NA	NA	I	--	--
III	Condenser cooling-water makeup	15,408.0	15,408.0	C	--	--
JJJ	Condenser cooling-tower evaporation losses	5,184.0	5,184.0	C	--	--
KKK	Condenser cooling-tower blowdown	10,224.0	10,224.0	C	--	--

Abbreviations:
C = continuous.
I = intermittent.
FGD = flue-gas-desulfurization.
NA = not available.

[a] See Figure 1-5.
[b] Key: C = continuous; I = intermittent.

Table 1-3. Comparison of the major environmental impacts of the principal alternatives for waste-heat rejection

Alternative	Thermal impacts	Entrainment impacts	Impingement impacts	Salt drift impacts	Fogging	Land requirements
1. Once-through cooling for Units 1-4, conventional screens, no dilution	Area of the warmest portions of the plume larger than that of any other alternative	Large numbers of organisms entrained (approximately 33% more than present entrainment with Units 1-3)	Impingement rates about 33% higher than present levels with Units 1-3	None	Occasional fogging of water areas into which discharge plume flows; some increase in area over existing situation with Units 1-3	Considered as base condition for this analytical table
2. Same as Alternative 1, but with dilution	Overall plume larger than that of any other alternative, but area of warmest temperatures smaller than that of Alternative 1	More organisms entrained than with any other alternative because of additional organisms introduced into thermal plume by dilution	Approximately the same as Alternative 1	None	About the same as Alternative 1	Commitment of small additional area adjacent to existing dilution system for third pump
3. Once-through cooling for Units 1-4, fine-mesh screens on Units 3 and 4, no dilution	Same as Alternative 1	Numbers of organisms entrained about the same as for existing Units 1-3	Impingement rates somewhat below present levels	None	Same as Alternative 1	Commitment of some small additional area in intake canal
4. Same as Alternative 3, but with dilution	Same as Alternative 2	Entrainment rate somewhat lower than with Alternative 2	Approximately the same as Alternative 3	None	Same as Alternative 2	Commitments as for Alternatives 2 and 3 combined
5. Once-through cooling for Units 1-4, fine-mesh screens on all units, no dilution	Same as Alternative 1	Lowest entrainment rate of all once-through alternatives; rate below that of existing system on Units 1-3	Lowest impingement rate of any of the once-through alternatives	None	Same as Alternative 1	Commitments of small area intake canal beyond that needed for Alternative 3
6. Same as Alternative 5, but with dilution	Same as Alternative 2	Numbers entrained greater than for Alternative 5 because of additional organisms introduced into thermal plume by dilution flow	Approximately the same as Alternative 5	None	Same as Alternative 2	Commitments as for Alternatives 2 and 5 combined
7. Saltwater cooling towers for Unit 4	Very small increase in size of thermal plume over present situation with Units 1-3	Very small increase in numbers entrained over present situation with Units 1-3	Very small increase in numbers impinged over present situation with Units 1-3	Largest quantities of salt released into air than with any cooling-tower alternative considered	Some fogging in area of the tower; no increase in sea fogging over present situation with Units 1-3	Large commitment of additional land areas to the south of discharge canal near mangrove area
8. Brackish-water cooling towers for Unit 4	Same as Alternative 7	None	None	Somewhat smaller quantities of salt released than in Alternative 7	Same as Alternative 7	Same as Alternative 7
9. Freshwater cooling towers for Unit 4	Same as Alternative 7	None	None	Lowest quantities of salt released of any cooling-tower alternative considered	Same as Alternative 7	Same as Alternative 7

Table 1-4. Costs of using once-through cooling with fine-mesh screens and a mechanical-draft cooling tower at Big Bend Station (Thousands of dollars)

Costs	Once-through cooling with fine-mesh screens		Cooling tower
	Units 3 and 4	Units 1 and 2	
Capital	$ 8,690	$6460	$31,373
Revenue requirements			
Operating cost penalties	520	520	19,256
Operation and maintenance	1,005	1005	1,173
Total	$10,215	$7985	$51,802

Table 1-5. Solid wastes produced by Big Bend Unit 4

Waste material	Quantity (tons/yr)[a]
Bottom ash[b]	25,680
Pyrites[c]	19,000
Fly ash[d]	102,700
Gypsum	210,000

[a] Based on the use of coal with an ash content of 13.5 percent and on a 28-year average capacity factor of 52.57 percent.

[b] Bottom ash assumed to be 20 percent of ash content.

[c] Pyrites assumed to be 2 percent of coal.

[d] Fly ash assumed to be 80 percent of ash content.

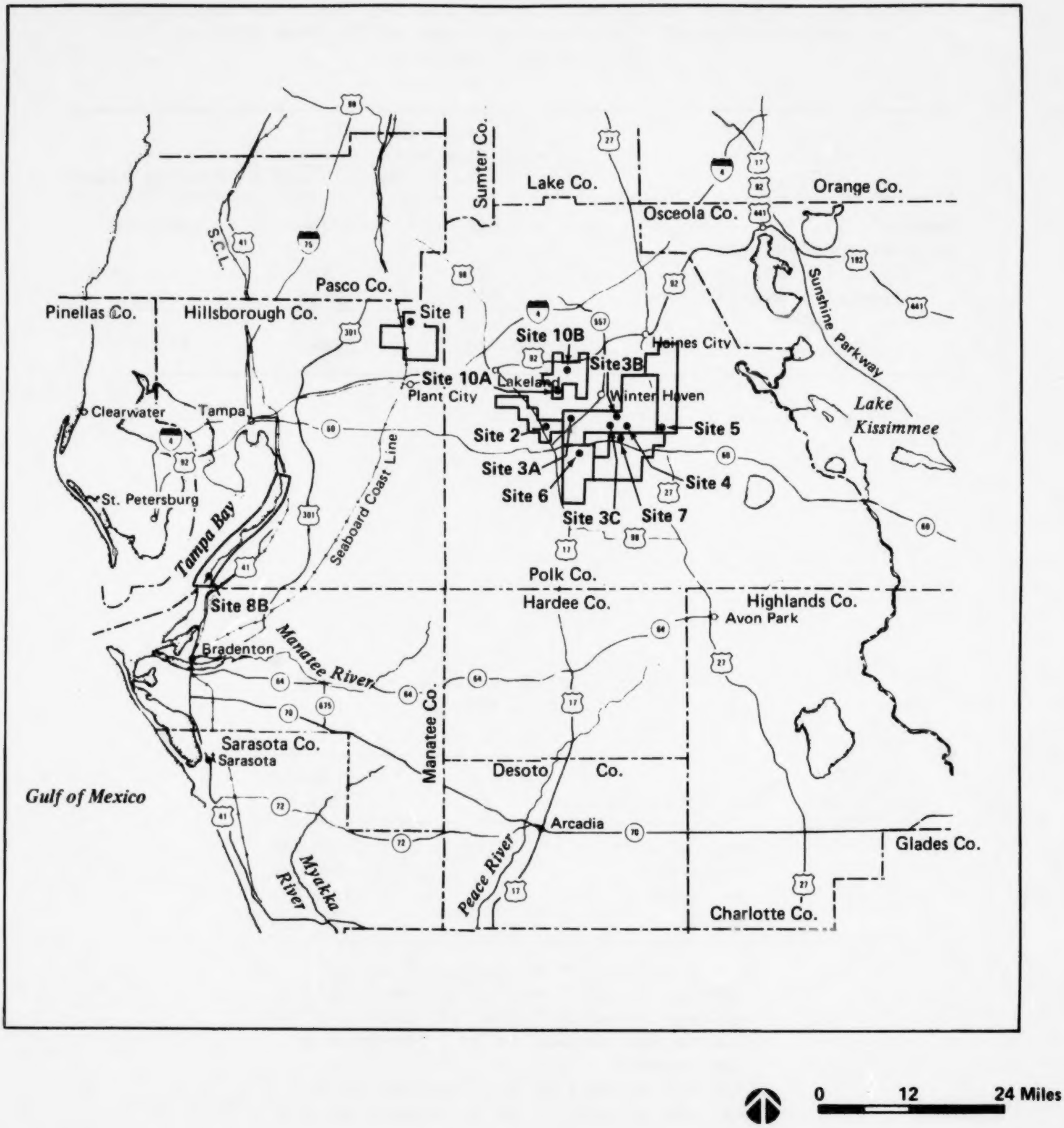

Sumter Co.
Lake Co.
Orange Co.
Osceola Co.
Pasco Co.
Pinellas Co.
Hillsborough Co.
S.C.L.
Site 1
Site 10B
Site3B
Haines City
Sunshine Parkway
Site 10A
Lakeland
Plant City
Winter Haven
Clearwater
Tampa
Lake Kissimmee
Site 2
Site 5
Site 3A
Site 4
Site 6
Site 3C
Site 7
St. Petersburg
Tampa Bay
Seaboard Coast Line
Polk Co.
Site 8B
Hardee Co.
Highlands Co.
Avon Park
Manatee River
Bradenton
Manatee Co.
Sarasota Co.
Sarasota
Desoto Co.
Gulf of Mexico
Arcadia
Glades Co.
Myakka River
Peace River
Charlotte Co.
0
12
24 Miles

Figure 1-2. Preferred sites.

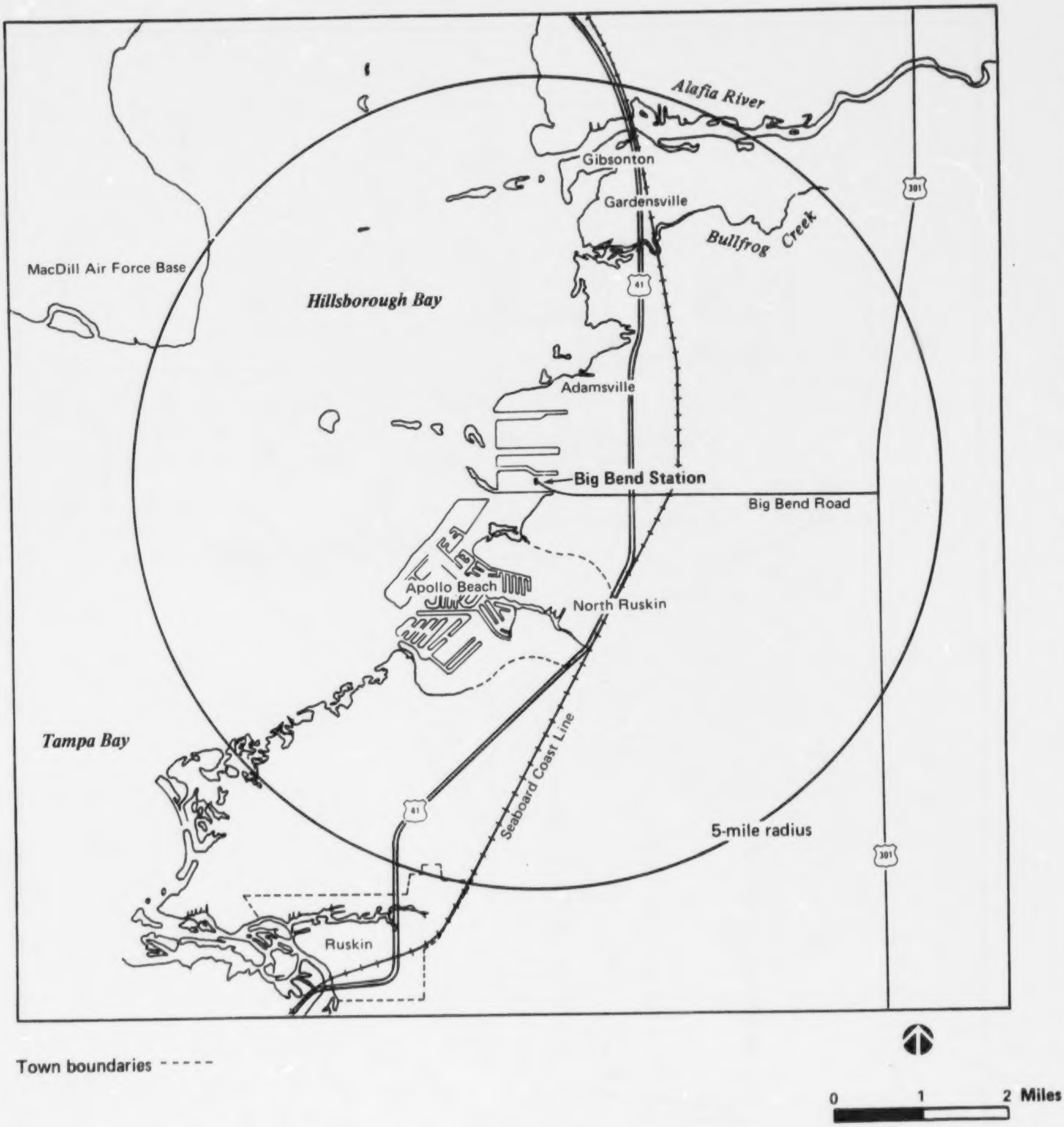
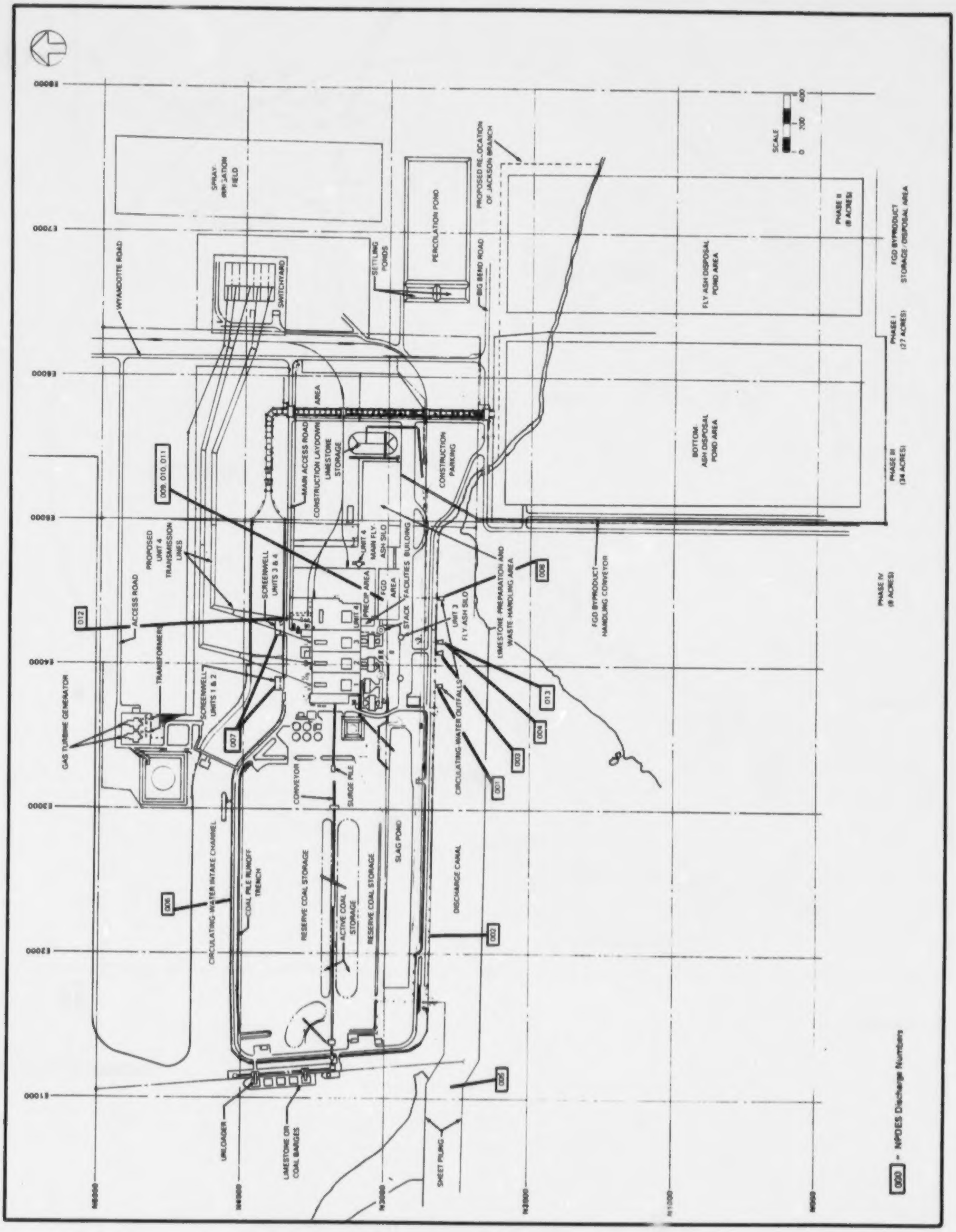
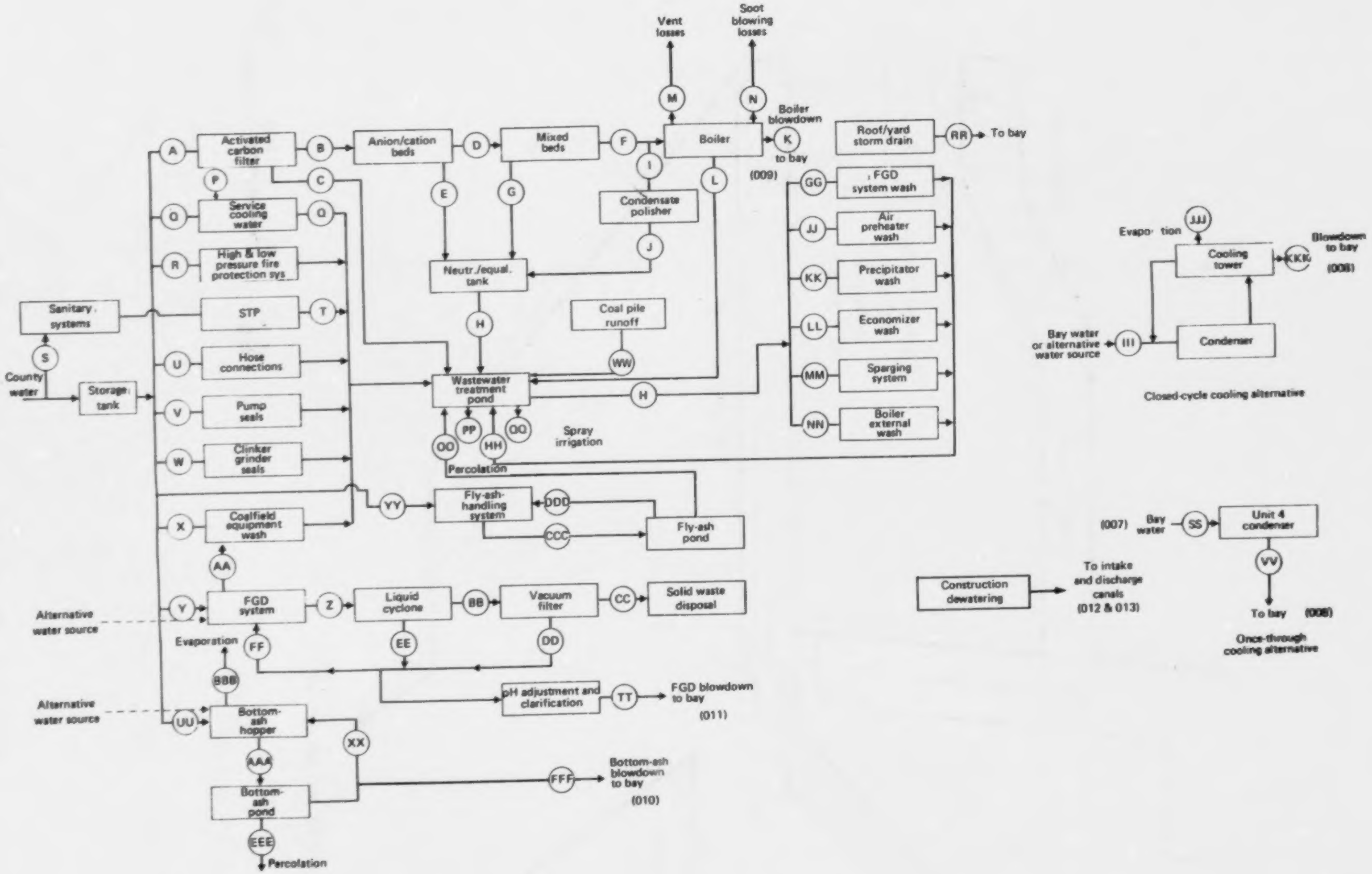

Alafia River
Gibsonton
Gardensville
301
Bullfrog Creek
MacDill Air Force Base
Hillsborough Bay
41
Adamsville
Big Bend Station
Big Bend Road
Apollo Beach
North Ruskin
Tampa Bay
Seaboard Coast Line
41
5-mile radius
301
Ruskin
Town boundaries - - - - -
0
1
2 Miles

Figure 1-3. General location of the Big Bend site.



SPRAY IRRIGATION FIELD
PERCOLATION POND
PROPOSED RELOCATION OF JACKSON BRANCH
SETTLING PONDS
BIG BEND ROAD
SWITCHYARD
WYANDOTTE ROAD
FLY ASH DISPOSAL POND AREA
PHASE II (8 ACRES)
FGD BYPRODUCT STORAGE/DISPOSAL AREA
PHASE I (27 ACRES)
BOTTOM ASH DISPOSAL POND AREA
PHASE III (34 ACRES)
CONSTRUCTION PARKING
MAIN ACCESS ROAD
CONSTRUCTION LAYDOWN AREA
LIMESTONE STORAGE
009, 010, 011
PROPOSED UNIT 4 TRANSMISSION LINES
SCREENWELL UNITS 3 & 4
UNIT 4 MAIN FLY ASH SILO
FGD AREA
PRECIP AREA
UNIT 4
FACILITIES BUILDING
STACK
UNIT 3 FLY ASH SILO
LIMESTONE PREPARATION AND WASTE-HANDLING AREA
006
FGD BYPRODUCT HANDLING CONVEYOR
PHASE IV (8 ACRES)
012
ACCESS ROAD
TRANSFORMER
GAS TURBINE GENERATOR
SCREENWELL UNITS 1 & 2
007
CIRCULATING WATER OUTFALLS
013
004
003
001
CONVEYOR
SURGE PILE
CIRCULATING WATER INTAKE CHANNEL
008
COAL PILE RUNOFF TRENCH
RESERVE COAL STORAGE
ACTIVE COAL STORAGE
SLAG POND
DISCHARGE CANAL
002
005
UNLOADER
LIMESTONE OR COAL BARGES
SHEET PILING
SCALE
0
200
400
E8000
E7000
E6000
E5000
E4000
E3000
E2000
E1000
N5000
N4000
N3000
N2000
N1000
N000
000 – NPDES Discharge Numbers

Figure 1–4. Plot plan, Big Bend Station.


Vent losses
Soot blowing losses
Boiler blowdown to bay (009)
County water
Sanitary systems
Storage tank
Activated carbon filter
Service cooling water
High & low pressure fire protection sys
STP
Hose connections
Pump seals
Clinker grinder seals
Coalfield equipment wash
FGD system
Bottom-ash hopper
Bottom-ash pond
Anion/cation beds
Mixed beds
Boiler
Condensate polisher
Neutr./equal. tank
Coal pile runoff
Wastewater treatment pond
Spray irrigation
Percolation
Fly-ash-handling system
Fly-ash pond
Liquid cyclone
Vacuum filter
Solid waste disposal
pH adjustment and clarification
FGD blowdown to bay (011)
Bottom-ash blowdown to bay (010)
Alternative water source
Alternative water source
Evaporation
Percolation
Roof/yard storm drain
To bay
FGD system wash
Air preheater wash
Precipitator wash
Economizer wash
Sparging system
Boiler external wash
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
AA BB CC DD EE FF GG HH JJ KK LL MM NN OO PP QQ RR SS TT UU VV WW XX YY
AAA BBB CCC DDD EEE FFF III JJJ KKK
Evaporation
Cooling tower
Blowdown to bay (008)
Bay water or alternative water source
Condenser
Closed-cycle cooling alternative
(007) Bay water
Unit 4 condenser
To bay (008)
Once-through cooling alternative
Construction dewatering
To intake and discharge canals (012 & 013)

Notes: See Table 1-2 for key.
Numbers in parentheses refer to NPDES Serial Numbers.

Figure 1-5. Plant water balance for Big Bend Station.

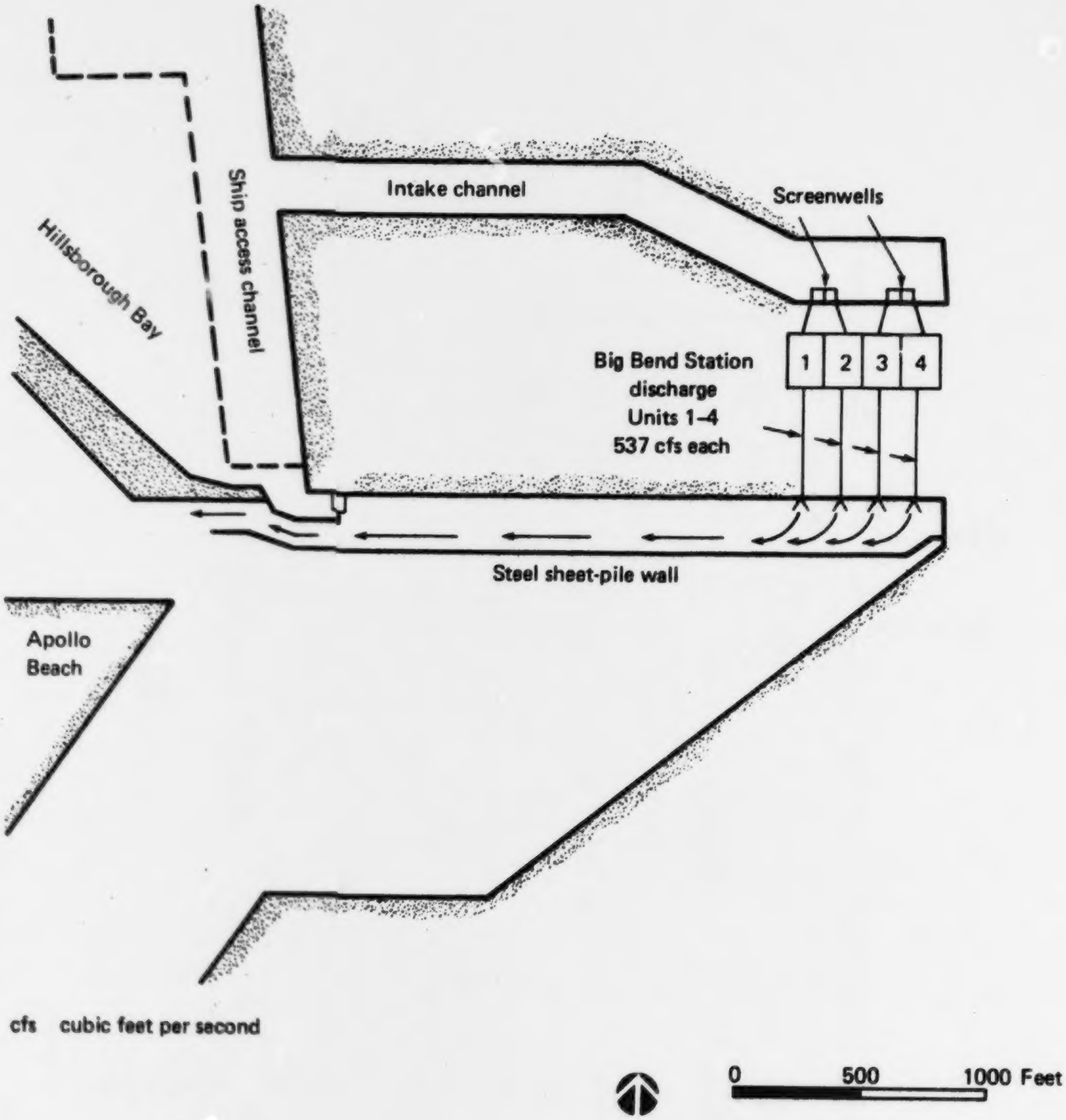

Intake channel
Screenwells
Ship access channel
Hillsborough Bay
Big Bend Station
discharge
Units 1-4
537 cfs each
1
2
3
4
Steel sheet-pile wall
Apollo
Beach
cfs cubic feet per second
0
500
1000 Feet

Figure 1-6. Once-through cooling system for Big Bend Units 1-4.

1.3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

1.3.1 ATMOSPHERE

1.3.1.1 Baseline Conditions at Big Bend

The climate of the site region is subtropical and is frequently affected by warm maritime air masses throughout the year and occasionally by cold, dry polar air masses during winter. The modifying effects of the Atlantic Ocean, the Gulf of Mexico, and Tampa Bay contribute to the relatively mild and humid winters and the very warm and very humid summers. Occasionally, cold air masses reach the region during the winter, resulting in freeze conditions. The region is subject to tropical storm activity.

The site region is within the northeast trade winds zone. Annual prevailing winds are from the east, with mean speeds generally less than 9 miles per hour (Figure 1-7). Wind directions are influenced locally by convectional forces inland and by land and sea breezes near the coast.

The region can be characterized as flat terrain, and significant topographic effects on dispersion meteorology are not expected. However, atmospheric dispersion and transport conditions can be significantly affected by coastal meteorological processes. Data from two sampling sites in the Tampa area indicate that neutral conditions predominate throughout the year. Unstable conditions are relatively more frequent during the spring and summer.

The TECO service area lies within the West-Central Florida Intrastate Air Quality Control Region (AQCR; Citrus, Hardee, Hernando, Hillsborough, Levy, Manatee, Pasco, Polk, Pinellas, and Sumter Counties). A portion of Hillsborough County has been designated as nonattaining for suspended particulates and a portion of Pinellas County has been designated as nonattaining for sulfur oxides. The whole of Hillsborough and Pinellas Counties has been designated as nonattaining for ozone. National and State of Florida ambient air quality standards (AAQS) applicable to the site are presented in Table 1-6.

The closest prevention of significant air quality deterioration (PSD) Class I area is the Chassahowitzka National Wildlife Refuge, located approximately 92 kilometers north of the Big Bend site in Hernando County. The remaining surrounding area is classified as PSD Class II area and thus is subject to less stringent restraints. The allowable increments by PSD class are presented in Table 1-7. The ambient onsite concentrations of sulfur dioxide, nitrogen oxides, and total suspended particulates do not exceed either NAAQS or State of Florida standards.

1.3.1.2 Impacts of Construction Activities

The most significant atmospheric impacts of Unit 4 construction will be the dust raised from disturbed land surfaces, the exhaust emissions of construction equipment and other motor vehicles, and the day-to-day noise endemic to heavy construction activity.

The dust raised by construction vehicles will be controlled by the spraying of construction roads with water. The use of dust retardants, windbreaks, dust fences, or temporary mulching to promote vegetation in dredged soils and in other exposed soil areas will be considered where appropriate. The speed of mobile construction equipment will be controlled so as to minimize the abrasion and pulverization of the soil.

Concentrations of nitrogen oxides, carbon monoxide, suspended particulates, sulfur dioxide, and hydrocarbons will increase as a result of engine exhaust from construction equipment and automobiles used by the construction work force. These impacts will be minimized through the proper maintenance of engines and machinery.

It is estimated that construction sound levels will generally be lower than the existing residual ambient sound level (i.e., the sound level equaled or exceeded 90 percent of the time). No serious impacts from onsite construction noise are expected in the surrounding private and public areas.

1.3.1.3 Impacts of Operation

Atmospheric impacts of the operation of Unit 4 will include fugitive dust emissions owing to the transport, handling, and storage of coal; the emission of such pollutants as sulfur dioxide, particulate matter, nitrogen oxides, and carbon monoxide from the coal-fired boiler; and noise.

Potential (uncontrolled) and controlled fugitive emissions from coal handling are estimated at 900 and 1200 tons per year, respectively. Fugitive dust emissions from the receiving, handling, and storage of coal will be minimized by the turning of the reserve coal piles, which ensures uniform surface moisture; the containment and control at transfer points, conveyors, and crushing equipment; and the proper maintenance of coal-handling facilities.

The air-quality impacts from the operation of Big Bend Unit 4 were determined by dispersion modeling using EPA-approved models. Table 1-8 compares Unit 4 emissions levels for SO_2 with AAQS.

Operation of Big Bend Unit 4 without Unit 3 is considered the worst-case emissions condition for impacts on nonattainment areas, since the stack exit velocity would be significantly reduced. Table 1-8 lists the SO_2 levels that would be expected in the nonattainment areas. A summary of Class II PSD increment consumption is included in Table 1-9.

The Class I PSD area nearest Big Bend is the extreme southeastern edge of the Chassahowitzka Wilderness Area, which is located approximately 92 kilometers from the site. The predicted impacts of sulfur dioxide are below the significance-of-impact levels, which for sulfur dioxide short-term averaging times are identical with the Class I PSD increments. Therefore, it is expected that such impacts at a distance of 92 kilometers will be much less than the allowable Class I increments.

The emissions of particulate matter from the boiler will be controlled by an electrostatic precipitator with a design specification of 0.03 pound per million Btu and 20 percent capacity. This will result in a particulate matter emission of 129.9 pounds per hour. Big Bend's compliance with AAQS for total suspended particulates is reflected in the projections of maximum ambient air quality impacts presented as Table 1-8.

The operation of Big Bend Unit 4 without Unit 3 is predicted to result in a maximum annual average concentration of total suspended particulates of much less than 1 microgram per cubic meter (Table 1-8).

The maximum PSD increment consumption for total suspended particulates (24.0 micrograms per cubic meter) occurred 200 meters south of the Agrico facility. Agrico's impact is expected to be 25.4 micrograms per cubic meter; therefore, there is a slight improvement in air quality. Only slight deterioration (0.3 microgram per cubic meter) is expected beyond 0.3 kilometer.

The emission of nitrogen oxides from the boiler will be controlled using a tangentially fired boiler having a design specification of 0.60 pound per million Btu and nitrogen oxide emissions of 2598 pounds per hour. The maximum annual nitrogen dioxide concentration from the operation of Big Bend Unit 4 is 0.5 microgram per cubic meter and is below the level of significant impact.

The maximum 3-hour carbon monoxide impact (developed using maximum 3-hour sulfur dioxide impacts) is 7.8 micrograms per cubic meter. This concentration is far below the level of significant impact and the resultant impacts will not violate AAQS.

All the sound levels due to the operation of Big Bend Units 1-4 are expected to meet or be below the maximum daytime (60 dBA) and nighttime (55 dBA) residential sound levels permissible under the Hillsborough County noise code. The nighttime intermittent sound levels are expected to range from 3 to 10 dBA higher than the residual nighttime levels, and the daytime intermittent sound levels are expected to be as much as 17 dBA higher than the residual daytime levels. However, similar variations in ambient sound levels presently occur because of variations in existing ambient noise sources. Therefore, noise from the operation of Unit 4 is expected to have no significant impact on the surrounding private and public areas.

1.3.1.4 Impacts of Cooling Towers

Potential impacts on the atmosphere from the operation of a mechanical-draft cooling tower include the effects of salt drift, ground-level fogging, and increased noise levels.

The potential occurrence of ground fog would be infrequent and generally confined to the immediate site area.

Salt drift from cooling towers is potentially subject to air quality regulations, including emission limitations, air quality standards, and PSD and emission offset regulations. The total drift emission, using a drift rate of 0.002 percent and a circulating water salinity of 42 parts per thousand, would be about 105 pounds per hour or 5 pounds per hour over allowable emissions.

Before definitive conclusions can be reached for Big Bend Unit 4, the combined effects of the stack, cooling towers, and other sources would have to be modeled together. The modeling would necessarily be based on a definition of suspended particles that would be acceptable to the appropriate regulatory agencies. The results of the modeling would then have to be compared to the "available" increment, which may be less than the total increment.

The impacts of cooling towers with brackish or freshwater makeup would presumably be similar to those described for the saltwater cooling tower. However, drift effects would be less severe. The reduced content of dissolved solids in the water would allow for a higher concentration factor (ratio of solids in the circulating water to solids in the makeup water) and higher drift rates. Alternatively, with equivalent drift rates, the salt deposition would be less than with saltwater makeup. The precise impacts would depend on the concentration of dissolved solids in the drift.

Noise impacts from mechanical draft cooling towers would meet applicable county noise codes.

1.3.2 LAND

1.3.2.1 Baseline Conditions at Big Bend

The Big Bend site is located on artificial fill dredged from the bottom soils of Tampa Bay. Unconsolidated materials lie beneath the artificial fill and overlie layered sedimentary rocks in two formations, the Hawthorn Formation and the Tampa Formation. These formations are composed principally of carbonate rocks, although the Hawthorn Formation contains a number of uncemented sediments.

Three soil associations occur at the Big Bend site. The Ruskin-Sunniland-Bradenton association covers approximately 70 percent of the Big Bend site area, and the saltwater swamp and marsh association covers about 25 percent. The remaining area is covered by the Ona-Scranton-Leon association.

Surveys of terrestrial flora and fauna, conducted at the Big Bend site during the period 1972 to 1977, were used as baseline data for the assessment of the environmental impact of the proposed Big Bend Unit 4.

The Big Bend site encompasses approximately 1,675 acres on the eastern shore of Hillsborough Bay. The distribution and areal extent of land use and vegetation cover types on the site, as determined from 1977 aerial photography are presented in Figure 1-8. The photographic data showed that approximately 30 percent of the site (mostly dredge-and-fill land) was committed to construction, electric-power-generating units, and associated facilities; 18 percent supported natural vegetation cover; 24 percent was improved or unimproved pastureland for cattle; 19 percent was intermixed with ponds and marsh; 1 percent was devoted to private residences; and 8 percent had other combined uses.

The natural vegetation at Big Bend has been greatly disturbed by human activities such as logging, cultivation, cattle grazing, construction, and the maintenance of transmission corridors. Consequently, the majority of vascular plants are ruderal.

Vegetation types observed on the Big Bend site during 1974-1975 were characterized as follows. Agricultural land was approximately 24 percent of the site and included both cultivated fields and pastureland for cattle. Recently abandoned agricultural land occupied approximately 12 percent of the site and was represented by a variety of old-field associations. Pine flatwoods accounted for approximately 4 percent of the site and was one of the less disturbed communities on the site. A mangrove community occupied about 12 percent of the Big Bend site and formed a distinct vegetational zone along the southwestern coastal portion of the site where tidal flushing occurred. This was the oldest and least disturbed community on the site.

Salt prairie occupied approximately 3 percent of the site and was dominated by halophytic plant species. There were also two small areas of impeded soil drainage on the site which were classified as freshwater wetlands. Included in one area was a small pasture pond surrounded by a low marshy area. During the 1977 survey, most of the open water had disappeared due to encroachment of herbaceous species.

In addition to the areas already discussed, a freshwater drainage canal traversed the southern portion of the site. The eastern end of the drainage canal was headed by a small freshwater marsh. The western portion of the canal merged with a brackish mangrove-*Spartina* marsh before discharging into Tampa Bay. The species in this area included both mesic and halophytic plant forms.

Terrestrial fauna that have been reported from the Big Bend site include 104 species of birds, 21 of which are species of special status; 19 species of mammals; and 6 species of amphibians. Also, 56 species of reptiles have been reported in Hillsborough County and could occur in terrestrial and aquatic habitats at the site.

1.3.2.2 Impacts of Construction Activities

The primary impacts associated with the construction of Unit 4 will include the commitment of approximately 41 acres of land for parking, equipment laydown, construction workshops, temporary storage of excavated material, and the erection of buildings that comprise and are associated with Unit 4. Unit 4 plant structures will require approximately 7 acres of land. An additional 7 acres will be designated for the coal reserve and service facilities associated with Unit 4. A railroad spur will also be constructed at the site. Much of the area that will be temporarily committed to laydown, parking, and excavated-material storage during construction will be restored during or after the completion of construction.

Clearing and construction activities will result in the displacement or elimination of all sedentary fauna (primarily small mammals) that may presently inhabit this area. This is not considered an important long-term ecological impact since these species most likely exist in more stable populations in nearby, less disturbed areas.

In addition to the 41 acres previously described, approximately 97 acres will be preempted by the sites for the storage and disposal of flue-gas desulfurization (FGD) byproduct gypsum. These 97 acres consist of approximately 66 acres of pastureland (including a small pond less than an acre in size and an associated marsh) and 31 acres of agricultural land.

The pastureland consists primarily of ruderal or weedy species of herbaceous vegetation. At the time of the ecological surveys conducted in 1977, this land was no longer being used as a cattle-grazing area. The 1974-1975 surveys showed that the pasture and pond/marsh areas supported a relatively small number of vertebrate species by comparison with less disturbed habitats at the Big Bend site. The 1977 survey indicated that most of the pasture pond had disappeared and vegetation was more typically old field (i.e., drier) than marshland. There was also an increase in vertebrate species preferring old-field habitats and a sharp decrease in the number of marshland species; marsh birds were notably absent from the area. The 31 acres of agricultural land represent supplemental sources of food and cover for wildlife, but their availabiliy depends on the types of crops planted and the frequency of tillage.

The development of the proposed gypsum storage and disposal area represents a long-term commitment of these pasture and agricultural lands. However, the preemption of these plant communities and wildlife habitats is more ecologically acceptable than that of other available parcels at the Big Bend site for two reasons: (1) these habitats have been recently disturbed and are not unique to the Big Bend site or the surrounding areas; and (2) they are among the least biologically important wildlife habitats at the site.

The ash-disposal ponds for Unit 4 will require 121 acres of land. The bottom-ash pond will be located in the area currently occupied by an unused U-shaped cooling pond. The fly-ash pond will be located adjacent to the bottom-ash pond on land classified as "old field." The impacts of the preemption of this area will be similar to those described in the previous paragraphs.

The only construction associated with the transmission lines for Unit 4 will be the installation of an additional 230-kilovolt circuit on the existing towers. There will be no need for a new right-of-way. Land areas beneath the transmission line (1) are zoned for industrial purposes, (2) do not include critical wildlife habitats, and (3) do not require the presence of man-made structures or alterations of terrain. Vegetation may be disturbed temporarily by vehicles carrying equipment, but since this will not affect any mature forest or important flora, irreversible impacts are not expected. Erosion problems also are not expected; however, should any problems develop, mitigation will be effected by the use of mulch, temporary or permanent vegetation, or erosion-control fabrics.

Dredging associated with the construction and installation of the Unit 4 cooling-water intake and discharge structures involves only a small amount of spoil material. This will be removed by clamshell and trucked to the two existing dredge-disposal areas. No discharge from the disposal areas is expected.

The conceptual location for a mechanical-draft cooling tower is directly south of the Unit 4 plant structure on the south bank of the discharge canal. The tower would be located so as to minimize impact on the nearby mangrove area.

The noise produced by construction equipment and related activities could have an impact on wildlife in the vicinity of the Big Bend powerplant. Responses of vertebrate fauna to construction noise may vary from species to species and will depend on distance from the powerplant and from other intrusive-noise sources. Species nearest the plant may undergo periodic "startle reactions" and move away from the noise source (if possible) when peak-construction sound levels occur; however, most of the species nearest the plant are expected to have adjusted to the existing noise from the operation of Units 1, 2, and 3. Fauna inhabiting areas other than the gypsum storage and disposal area should experience little, if any, increase in noise levels during construction. For this reason, no measurable effects of construction noise on species occurring near or beyond these locations are expected.

Site restoration will begin during the latter stages of construction or after its completion. Certain areas will be surfaced with crushed stone to maintain areas frequently used by maintenance personnel and heavy equipment. Trees, shrubs, and ground cover will also be planted during site restoration. The vegetation will be selected to satisfy three primary objectives: (1) the stabilization of soils, (2) the creation of an aesthetically appealing physical plant and surrounding area, and (3) the establishment of wildlife habitats and food sources.

1.3.2.3 Impacts of Operation

Terrestrial impacts from operation of Big Bend Unit 4 may result from coal handling and operation of the sulfur dioxide and particulate emissions control systems.

Because the coal will be received, stored, and handled in the same manner and with the same facilities as are now used for Units 1, 2, and 3, no adverse impacts on the terrestrial ecosystem are expected. Impacts due to dust and noise may occur, but these will be minor and will not affect the important wildlife or their habitats. Runoff from the coal-storage pile will be controlled by retention trenches, and contamination of adjacent soils is not expected.

The primary impact on terrestrial systems from the operation of the sulfur-dioxide-control system will be the preemption of approximately 97 acres of land for the gypsum storage and disposal area. Depending on the marketability of the gypsum, onsite storage and disposal will either temporarily or permanently remove the area from further use for the lifetime of the plant.

The gypsum will be transported to the propsed site by means of a conveyor system and will be handled by bulldozer. At this stage, it should contain approximately 10 percent water; therefore, it should not undergo wind erosion or create a fugitive-dust problem during transport.

If permanent disposal is necessary, the material will be landfilled in a heaped fill configuration. Experience with this type of landfill has shown that problems arising in the areas of ground-water pollution, slope stability, and site preparation are minimal in comparison with other disposal methods.

Fugitive-dust problems are not expected, since the gypsum, when left undisturbed, forms a protective crust that minimizes wind erosion and dusting tendencies.

The primary impact on terrestrial systems from the operation of the particulate control system will be the preemption of 121 acres for the settling ponds and disposal cells for bottom ash, unmarketable fly ash, pyrites removed from the coal before combustion, and economizer ash. Other potential terrestrial impacts from the control of particulates include (1) the use of active disposal ponds by waterfowl and (2) the effects of runoff and seepage from disposal sites.

The presence of a large body of standing water can sometimes be attractive to waterfowl as a resting and feeding area, particularly if there are sources of food nearby. Ash-settling ponds are examples of such bodies of water. Waterfowl using these ponds are thus exposed to potentially harmful particulates and chemicals dissolved in the water.

During the operation of a powerplant, runoff from the onsite waste impoundment is unlikely if the dikes confining the ash are properly constructed. Vertical and lateral seepage from unlined ash-disposal sites can occur, particularly where the waste material is deposited as a slurry. The major impact of seepage is the addition of potentially toxic elements and ions to soils, ground water, and surface waters. In addition, seepage introduces radionuclides and other potentially harmful elements into the growth medium of local vegetation.

The bottom-ash settling ponds for Big Bend Unit 4 will be unlined and designed to store approximately 6 months of ash production. As these ponds are filled, the ash will be hydraulically dredged to final disposal cells.

The settling ponds and disposal cells for unmarketable fly ash, pyrites, and economizer ash will be lined and enclosed by earthen dikes. Liner material will have a low permeability (0.0000001 centimeter per second).

1.3.2.4 Impacts of Cooling Towers

The primary impact on terrestrial systems from the operation of mechanical-draft cooling towers using saltwater makeup will be salt deposition due to drift. The drift predictions for the mechanical-draft tower are given in Figure 1-9, which shows annual average deposition rates within approximately 1 mile of the proposed tower location.

The data suggest that there are two areas near Big Bend Station of primary importance in evaluating the potential terrestrial impacts of cooling-tower salt emissions. One area consists of the palmetto-Juncus and palmetto-pine associations in the area adjacent to and south of the proposed cooling-tower location. Based on the predicted salt levels and on the reported susceptibility of vegetation to salt damage, it would appear likely that much of the vegetation in the palmetto-pine and palmetto-Juncus associations would be severely injured as a result of foliar salinization.

The other area of primary importance lies to the east and southeast of the cooling tower. Within this area, crops such as tomatoes, red peppers, sweet onions, and strawberries are grown commercially. Of these crops, tomatoes are moderately salt-sensitive and peppers, onions, and strawberries are very salt-sensitive. The occurrence and salt tolerance of ornamentals in offsite residential areas are presently unknown.

The synergistic effects of cooling-tower drift and stack emissions (e.g., sulfur dioxide, nitrogen oxides, and particulates) represent another potential source of damage to vegetation near Big Bend Station.

The impacts of cooling towers with brackish and freshwater makeup would presumably be similar to those described for the saltwater cooling tower. However, drift effects would be less severe because of differences in the makeup water. The reduced content of dissolved solids in the water would allow for a higher concentration factor (ratio of solids in the circulating water to solids in the makeup water) and higher drift rates. Alternatively, with equivalent drift rates, the salt deposition would be less than with saltwater makeup. The precise impacts would depend on the concentration of dissolved solids in the drift.

1.3.3 WATER

1.3.3.1 Baseline Conditions at Big Bend

Surface and Ground Water Hydrology

Big Bend Station is located near the mouth of Hillsborough Bay, a northeasterly extension of the Tampa Bay estuarine system which has a total surface area of approximately 350 square miles and a shoreline of approximately 210 miles. The mean water depth is 11 feet, and 90 percent of the estuary is less than 22 feet deep. The drainage area of the Tampa Bay system is estimated to be 2235 square miles.

Hillsborough Bay is approximately 8 miles long and 4 miles wide and has a surface area of about 35 square miles. The average water depth is 10 feet. Shipping channels have been maintained in the bay at 34-foot depths and are presently being deepened to 40 feet as part of the Tampa Harbor Deepening Project.

Tides in the Tampa Bay system are predominantly diurnal with a strong semidiurnal component. The diurnal tide ranges from 2 to 2.8 feet, with Hillsborough Bay having a range of approximately 2.8 feet. The average water level in Tampa Bay is 0.5 foot above mean sea level and the average water level in Hillsborough Bay is 1.4 feet above mean sea level.

Tidal currents in Hillsborough Bay are generally weak and variable; the velocity is seldom greater than 1 foot per second. The circulation in Tampa Bay results in minimal flushing of Hillsborough Bay.

The freshwater discharge into Hillsborough Bay is about 1120 cubic feet per second. The main surface drainage basins in Hillsborough County are the Hillsborough, Alafia, and Little Manatee River systems. Two other streams, Bullfrog Creek and Palm River, discharge directly into Hillsborough Bay. Three intermitttent streams pass through the site: Sims, Jackson, and

Newman Branches. These ditches carry water only during and immediately after heavy rainfall.

In Hillsborough County, ground water occurs in a series of unconfined, semiconfined, and confined aquifers composed of undifferentiated surface sands and clays. The water table generally yields about 5 gallons per minute in wells 20 feet deep. A major source of this water is local rainfall, with an estimated 700 cubic feet per second of precipitation infiltrating into the aquifer.

Underlying the water-table aquifer is the shallow artesian aquifer in the sand and limestone beds of the Hawthorn Formation. These beds are approximately 65 feet thick at the Big Bend site. Wells in this aquifer yield up to 500 gallons per minute of water of relatively poor quality. The aquifer is recharged by upward leakage from the Floridan aquifer.

The ground-water body under the site has average water-table elevations ranging from 5.5 to 4.0 feet above mean sea level during nondrought periods. Available literature suggests that the water table drops considerably during periods of severe drought. There is also evidence of contamination of the water table by inflows of saltwater. The permeability of the first 15 feet of soils ranges from 0.01 to 0.0001 centimeter per second. During a 1973 geotechnical investigation, the water table along the northern edge of the proposed gypsum storage/disposal area was monitored by means of four shallow wells. The data collected revealed a hydraulic gradient on the order of 0.006 foot per foot, which indicates ground-water flow from east to west. The transmissivity of the surficial aquifer was estimated to be 1060 gallons per day per foot with a flow rate on the order of 0.6 gallons per day per foot of aquifer width.

Surface and Ground Water Quality

Hillsborough Bay is bounded on the west, north, and northeast by the City of Tampa. Numerous heavy-industrial facilities and port terminals are located along the north and northeast shores of the bay. Hillsborough Bay waters are generally regarded as the most polluted of the Tampa Bay system. The pollution is attributable to the discharge from sewage-treatment plants, numerous industrial pollutants, and large amounts of nutrients (introduced naturally from rivers and artificially from various phosphate-industry-related activities). In addition, the region is one of low salinities and high turbidities.

Water temperatures in the Tampa Bay system range from 10.0 to 32.0°C , with a mean annual temperature of 22.0 to 25.0°C, and a naturally occurring maximum of 36.9°C. Hillsborough Bay has a range of 11.2 to 35.1°C. Water temperature near the Big Bend site has increased since the 1970 startup of Big Bend Unit 1. Following startup of Big Bend Unit 2 in early 1973, data collected during monitoring programs indicated the annual means and ranges of water temperature near the site had increased several degrees over the published averages for Tampa Bay.

Water quality data for Hillsborough Bay are presented in Table 1-10, and Table 1-11 contains information on the quality of water collected in the Big Bend intake canal.

The water quality of the surficial aquifer at the Big Bend site is given in Table 1-12. The surficial aquifer has relatively high concentrations of chloride, sodium, sulfate, and calcium, indicating that saline water has mixed with water traveling downgradient in the surficial aquifer. The water exceeds EPA standards for chloride, sulfate, manganese, and total dissolved solids, and exceeds the suggested standards for arsenic.

Data on the water quality of the Floridan aquifer in the site area are limited. Characteristics of the aquifer in the general Tampa Bay drainage area are presented in Table 1-13. Table 1-12 lists water-quality data for several parameters based on the concentrations measured from several wells in the site area. The sulfate concentration exceeds EPA-recommended drinking-water limits.

Aquatic Ecology

Numerous investigations of the ecology of the Tampa Bay system in the vicinity of Big Bend have been conducted by the Applicant and others on an intermittent basis since 1960.

Phytoplankton. A total of 133 phytoplankton taxa were recorded from the vicinity of the Big Bend powerplant during a study conducted in 1976-1977. These taxa included 83 diatoms, 42 dinoflagellates, and 8 other groups. Ten taxa comprised more than 90 percent of total phytoplankton organisms collected with diatoms accounting for the largest portion of these phytoplankton. It should be noted that only the larger, armored phytoplankton forms were collected in the coarse-mesh nets used in these studies. Unaccounted for were the small, fragile species (i.e., "naked" flagellates), which typically make up the larger percentage of phytoplankton organisms occurring in estuarine systems.

Planktonic blue-green algae (primarily *Oscillatoria* sp.) shared dominance with diatoms or dominated phytoplankton numbers from late summer through early fall.

Macrophytes. Several largely qualitative studies of the benthic macrophyte communities in Tampa Bay have included sampling sites in the Hillsborough Bay and Big Bend areas.

During a field survey of benthic macrophyte distribution conducted in Tampa Bay during the fall of 1960, attached benthic plants were found only in sparse, scattered patches in the Hillsborough Bay. In the shallow waters of the Big Bend area, however, shoal grass (*Halodule*) was common and widgeon grass (*Ruppia*) abundant; offshore, within the 1-fathom contour, manatee grass (*Syringodium*) was abundant and *Ruppia* sparse.

Data collected during the period 1970-1973 suggested that benthic macrophytes in the Big Bend area were sparsely distributed and of limited diversity. However, the limited qualitative studies conducted from 1970-1975 do not allow for a definitive evaluation of the possible effects of powerplants or other activities on macrophyte distribution.

During quantitative surveys conducted quarterly at Big Bend during 1977-1978, seagrass-sampling transects were established in the dilution-pump intake canal, in the embayment south of the discharge canal, and in a control area located south of the main study area.

In contrast to the control area, only one seagrass species, *R. maritima*, was observed at the embayment stations. The degree of coverage and density varied widely during sampling. *Ruppia* were completely absent at sampling stations during September and December of both study years. Coverage and density were very low during both years on the transect located at the former site of thermal discharge into the embayment. On the test transect near the dilution-pump intake, only limited coverage of *H. wrightii* was observed and this only sporadically.

The differences between the transects in the control area and in the test areas near the plant may have resulted from past dredge-and-fill activities related to'powerplant construction and to other development in the area (e.g., Apollo Beach residential communities), as well as possible thermal effects of powerplant operation.

Zooplankton. Studies carried out over the period 1970-1975 revealed that the zooplankton community in the area of Big Bend was typically dominated by copepods, of which cyclopoids were generally more abundant than calanoids. Copepod nauplii, pelecypod (bivalve) and gastropod veliger larvae, and polychaete larvae were also abundant. Organisms that were seasonally abundant included echinoderm and cirriped larvae, cladocerans, appendicularians, rotifers, and tintinnids.

Zooplankton studies were also conducted from January 1976 to March 1977 as part of an investigation for Units 1, 2, and 3 to evaluate the distribution, abundance, and entrainment potential for the planktonic stages of fish and benthic invertebrates (meroplankton).

Eggs from 12 families of fish were collected during the 15-month study. Two families, Engraulidae and Sciaenidae, accounted for 73 and 26 percent, respectively, of all eggs collected. The collections included larvae of 41 species of fish in 22 families. Again, engraulids were the most common larvae, accounting for 87 percent. Both fish eggs and larvae were taken during every month of the study. The greatest densities occurred during spring and summer; the lowest, during winter.

The bay anchovy, an important forage species, was the most common engraulid. Members of the economically important family Sciaenidae accounted for 26 and 4 percent, respectively, of all fish eggs and larvae collected. The specific identification of sciaenid eggs and early larvae is generally not possible. However, based on those larval stages that could be identified, sciaenids accounted for a larger number of species than any other fish family. The species collected included silver perch, sand seatrout, spotted seatrout, spot, southern kingfish, northern kingfish, and black drum.

Larval clupeids, carangids, pomadasyids, sparids, and gobiids were also commonly taken in spring and summer, although each family accounted for less than 3 percent of all larvae collected. Winter samples were dominated by blenny and goby larvae, but numbers were usually low. The larvae of pinfish, menhaden, and spot migrated into the study area during January and February.

A total of 105 invertebrate taxa, of which 86 were decapod crustaceans (shrimp, crabs, etc.), were recorded from the meroplankton collections, made from 1976 to 1977. Larval decapods accounted for 94 percent of the larval invertebrates taken in the collections. However, nondecapod invertebrate larvae, which are typically the numerically dominant meroplankton organisms in the area, were undoubtedly underestimated because they passed through the mesh (363 micrometers) of the sampling nets.

Commercially important taxa included the larvae of stone crab and blue crab, and the postlarvae of pink shrimp.

Studies conducted at Big Bend from February 1979 to February 1980 concentrated on the distribution, abundance, and entrainment potential of meroplanktonic stages of a select group of "representative important species" (RIS) of fish and invertebrates. Additional analyses were conducted on selected samples to compare the distribution, abundance, and entrainment potential of RIS taxa with that of other meroplankton taxa.

The bay anchovy was the most abundant RIS taxon. Representative important species of the family Sciaenidae collected during 1979-1980 included silver perch, spotted seatrout, and black drum. A large number of unidentifiable eggs with characteristics common to the family were grouped as "Unidentified Sciaenid Eggs." (At least nine species of this family are known to occur in the Big Bend area.)

The selected samples collected from March to October contained the eggs and larvae of 16 additional species representing 13 fish families. The eggs and larvae of the bay anchovy, an RIS fish, were more abundant than those of any other fish species in the selected samples, accounting for 50 and 74 percent, respectively, of all fish eggs and larvae. Unidentified Sciaenidae accounted for most (48 percent) of the other fish eggs. Other families represented by eggs included Soleidae, Carangidae, Clupeidae, and Triglidae. The scaled sardine ranked second in larval abundance (16 percent). Other species averaging more than 1 percent of total fish larvae were the feather blenny and the sand seatrout, which accounted for 1.5 and 1.1 percent, respectively.

Other commercially important non-RIS fish that were taken as larvae include kingfish, sheepshead, and pigfish.

Of the invertebrate RIS taxa, only stone crab larvae and pink shrimp postlarvae occurred in the 1979-1980 collections. The presence of larvae of the eastern oyster was demonstrated by oyster spat studies.

In addition, larvae of the brief squid (*Lolliguncula brevis*), which has commercial value in the Tampa Bay area as bait, occurred in the collections during April and May.

Benthic Invertebrates. Studies of Tampa Bay have indicated that the bay system, in general, supports an abundant and diverse assemblage of benthic invertebrates. However, in Hillsborough Bay and several other areas of the bay system, dredge-and-fill operations and pollution, both domestic and industrial, have resulted in the presence of soft, highly organic sediments, a high biological oxygen demand, and low dissolved-oxygen concentrations, conditions that severely limit the distribution, diversity, and abundance of benthic invertebrates.

Early benthic studies at Big Bend were largely qualitative. Studies from 1970 to 1975 in the nearshore area near the plant revealed organism assemblages typical of a highly disturbed estuarine environment. The findings were attributed to the highly disturbed nature of the sediments in the area, likely a result of the extensive dredge-and-fill operations and other construction activities at the powerplant site, Apollo Beach, and nearby waterfront residential areas.

A total of 337 benthic infaunal invertebrate taxa were recorded at Big Bend during 1976-1977. Nine species accounted for approximately 70 percent of the total number of organisms.

Studies of the benthic infauna were conducted during 1979 to evaluate the ecological effects of a shutdown of the Big Bend power-plant dilution pumping system.

Comparison of the results of the studies reveals a dramatic change in the area. The early studies revealed an abundance of mollusks and crustaceans. During 1979, the benthic infauna were composed mainly of polychaetes and other deposit feeders. During 1979, the general distribution of the dominant taxa near the plant discharge and in the embayment south of the discharge canal differed from that at all other stations studied. The results suggest the presence of "pioneer" conditions at these stations (i.e., an abundance of pollution-indicator and opportunistic species). In general, both density and species richness at all open-bay stations were considerably lower during 1979 than during 1976. Species diversity and equitability in 1979 were comparable to or greater than those in 1976, probably because of the reduced dominance of a single species. Differences in species composition and community parameters between the two study years were not restricted to the thermal areas; rather, they appeared to reflect an area-wide change in the benthic community. The dramatic change in benthic species composition, apparent from the 1979 studies, was viewed as the result of a combination of natural cyclic phenomena and perturbation of the entire Tampa Bay system owing to the extensive dredging activities of the Tampa Harbor Deepening Project.

Fishes. Juvenile and adult fish were collected by seine and trawl in the Big Bend area from 1970 to early 1977 and during 1979-1980. The objectives of the earlier studies were to determine the composition and the temporal and spatial distribution of the fish community in the vicinity of Big Bend and to evaluate powerplant effects on the community. The 1979-1980 study was designed to provide information on RIS fish taxa for assessing the potential effects of Big Bend Unit 4.

During 1976-1977, a total of 61,273 fish representing 56 species in 32 families were collected in 180 seine hauls. Most fish were collected in the shallow inshore areas. The tidewater silverside was the most common fish, followed in relative abundance by the bay anchovy and the longnose killifish.

Most of the fish commonly collected in 1976-1977 also had been dominant during previous quantitative sampling in the study area.

The findings suggested that the habitats represented by these areas served as nursery areas, the northern embayment formed by Apollo Beach apparently being the most important. Overall, the seine studies revealed the transient nature of the fish community in the Big Bend area. Most catches were generally dominated by a few species (two to six), but the dominants changed with time. Seasonal influxes of certain species caused shifts in community structure throughout the study period. This phenomenon was particularly pronounced at the "nursery" stations.

Fewer bay anchovies were collected by seine during the 1979-1980 study than in 1976-1977. Most fish collected in 1979-1980 were adults in spawning condition. However, in the earlier investigation, which included stations not sampled in 1979-1980, several thousand juveniles were taken.

The tidewater silverside was the most abundant and ubiquitous fish collected in seine hauls during 1979-1980. The silver perch, typically a deep-water species, was not collected by seine but was the most abundant RIS fish taken by trawl, primarily in the plant discharge canal.

A total of 47 non-RIS fish species were collected by seine. The five most abundant species were longnose killifish, spot, pinfish, sheepshead minnow, and rough silverside. The trawl catch included 43 non-RIS species. The five species most commonly collected were sand seatrout, pinfish, sea catfish, spot, and pigfish.

In general, the seasonal trends observed in non-RIS species composition and relative abundance during 1979-1980 are consistent with those observed in previous studies in the Big Bend area. Any differences could be attributed to the natural cyclic variations in distribution and abundance typical for many estuarine organisms.

Manatee. The Florida or West Indian manatee is listed as an endangered species by the Federal Government and by the Florida Game and Fresh Water Fish Commission. It is also considered threatened by the Florida Committee on Rare and Endangered Plants and Animals. In U.S. waters, manatees are protected by the Marine Mammal Protection Act of 1972.

Manatees have been frequently sighted along the eastern shore of Tampa Bay, including Hillsborough Bay, and in the Little Manatee, Alafia, and Hillsborough Rivers. Winter congregations have been reported at Big Bend. The U.S Department of the Interior has listed the Little Manatee River below Route 301 and the Alafia River from the U.S Highway 41 bridge west for 1 mile to its confluence with Tampa Bay as critical habitat for manatees in Hillsborough County.

TECO sponsored a study of the occurrence of the manatee in Tampa Bay and in the vicinity of the Big Bend site between November 1979 and February 1980. The purpose was to document the use of the Big Bend warm-water discharge canal by manatees and to compare the significance of the site as a winter refuge against other refuges available in the area. Manatee sightings were most common at the mouth of the Manatee River during the warmer months and in the warm-water refuges during colder months. The highest count during a single aerial survey was 55.

As a warm-water refuge, the Big Bend powerplant ranked second in importance to the Gardinier Phosphate Plant on the Alafia River. As many as 10 manatees were observed at Big Bend during a single survey, while up to 42 were sighted at the phosphate plant during an overflight in February. The eastern end of the Big Bend discharge canal (except for the boat ramp area) appeared to be the region most regularly used by the manatees.

Use of the area by manatees may increase with the increase in thermal discharges attributable to the operation of Big Bend Unit 4. Manatees could occur in the area during critical temperature drops in early winter, especially when the air temperature drops below 10°C and water temperatures in the thermal plume range from 16 to 20°C. They are not expected to remain in the area the entire winter, but should migrate to other nearby areas in Tampa Bay when the air and water temperatures increase. Their occurrence will also depend on food availability in the discharge area.

Dolphins. Twenty-one species of cetaceans (dolphins and whales) have geographic ranges that could include Tampa Bay or adjacent waters of the Gulf of Mexico, but only the bottle-nosed dolphin is expected to occur in the Big Bend area with any regularity. This species, like all cetaceans, is protected by the Marine Mammal Protection Act of 1972. During the Applicant-sponsored aerial survey of Tampa Bay from June 1979 to February 1980, a total of 66 dolphin herds and another 140 individuals were sighted.

1.3.3.2 Impacts of Construction

Construction of the Unit 4 discharge structure will have a primary impact on the aquatic environment. This structure will be located in the 350-foot-wide plant discharge canal east of the existing Unit 3 outfall. Approximately 690 cubic yards of sand and silt will be dredged from an area extending 80 feet in the canal. It is estimated that 3,205,000 benthic invertebrates will be removed in the dredge material. The benthic community in the discharge canal is dominated by species that are classified as opportunistic or as characteristic of thermally stressed areas. A silt barrier will be maintained during the operation.

It is expected that those fish inhabiting the discharge canal would avoid areas of activity and would return after construction is completed. Manatees congregate occasionally in the warm waters of the discharge canal during the winter months. Discharge construction activities will be scheduled so as to cause minimal interference with the activities of this endangered species.

The intake structure for Unit 3 will be extended to provide for the Unit 4 circulating-water pumps and the fine-mesh-screen enclosure. Approximately 420 cubic yards of sand and silt will be dredged from a 50- by 55-foot area to accommodate the structure. Loss of some benthic invertebrates is expected. Silt barriers will be used during this construction.

During construction, the ground-water elevations in the immediate vicinity of Unit 4 will be lowered by the gravity dewatering system required for earthwork. The results of previous field-dewatering tests suggest that this dewatering activity will not have any noticeable effects on private or agricultural wells in the area, either in the available quantity of water or in its quality. Since the construction site is on a narrow peninsula, the ground-water quality in the area is highly influenced by, and similar to, the bay-water quality. The construction dewatering effluent will be discharged to the intake and discharge canals (NPDES Serial Nos. 012 and 013). After construction, the dewatering system will no longer be needed, and ground water will be allowed to rise to its natural elevation.

For construction of the bottom- and fly-ash disposal pond areas, it will be necessary to relocate Jackson Branch to a course east and north of the disposal areas. Approximately 2400 feet of channel will be bypassed and filled (a volume of some 15,250 cubic yards) and 2900 feet of new channel will be constructed. Cut material from the new channel will be used to fill the old channel or hauled to upland disposal sites. The relocated portion of the stream bed will initially have a substrate of disturbed naturally occurring material, predominantly shelly sand. The stream bank will be allowed to revegetate naturally and is expected to resemble portions of the present stream bed after a few years. The productivity of the relocated portion of the stream will be appreciably decreased; however, since the stream-area inflow is small, it is expected that this loss of productivity will have no observable effect on Tampa Bay. The ash-disposal ponds will be diked for the 100-year flood, so there will be no stormwater discharge into the relocated Jackson Branch channel.

The construction of the gypsum storage and disposal areas will not disturb the main channel of Newman Branch. Small drainage swales and ditches, previously constructed to drain the area for agricultural use, will be filled before and during the use of this area for gypsum storage and disposal. These swales and ditches are nontidal and intermittent water courses. It is therefore expected that there will be little or no impact on the biota of Newman Branch or Tampa Bay as a result of their removal. Since the gypsum storage and disposal area will be diked for the 100-year flood, there will be no stormwater runoff from this area.

Dredge spoil and cut material from Unit 4 construction will be disposed of at either or both of the two dredge disposal areas that were used for construction related to Units 1-3. No discharge from the disposal areas is expected.

Maintenance dredging has been performed at Big Bend in the past, and it is conceivable that some maintenance dredging for Unit 4 will be necessary in the future. Depending on the location and volumes, either clamshell or hydraulic dredging will be used. At present, when material is hydraulically dredged to the disposal areas, overflow is discharged to the bay via the local canals. The overflow from the process, other than being slightly more turbid, is similar to bay water. Adjustable flashboard risers and silt barriers are used for controlling the water quality.

There will be no discharge of runoff degraded by construction of the unit building, the FGD system, and the limestone facilities. All such runoff will be intercepted and pumped to the wastewater-treatment pond.

1.3.3.3 Impacts of Operation

The potential impacts of the operation of Unit 4 on water quality, aquatic ecology and water resources include those due to coal handling, the sulfur-dioxide-control system, the particulate-control system, and the once-through-cooling alternatives. Impacts from freshwater usage and the wastewater-treatment system also may occur.

Impacts of Coal Handling

A coal-pile runoff collection and treatment system has been provided for Big Bend Station Units 1, 2, and 3. It is designed to capture and retain runoff resulting from a design storm established by the U.S. Environmental Protection Agency (the most severe 24-hour storm that can be expected once in 10 years). To accommodate Unit 4, the runoff collection system will be modified to intercept all storm runoff and pump it to the existing demineralizer-waste sump for transfer to the wastewater pond.

Most of the leachate from the coal pile will be collected in ditches for transport to the wastewater pond. The amount of leachate that does infiltrate into the ground water is expected to be less than or equal to the natural recharge and should be insignificant. Since the peninsula on which the plant is sited is dredged material, the ground water beneath the coal pile is bay water. The impact of the leachate on this water will have to be judged in terms of the quality of the intruded bay water and on the amount of leachate generated by the proposed expansion of the existing coal pile.

Impacts of Sulfur Dioxide Control

The limestone pile for the flue-gas-desulfurization (FGD) system will be located on the peninsula and will cover an area of about 1.5 acres. The pile will be enclosed by a covered building to control limestone moisture. This will prevent runoff and leachate production.

Runoff from the FGD storage and disposal site can directly affect surface-water quality, and leachate can directly affect ground-water levels and quality. Berms designed to withstand a 100-year flood and storm surge will surround the entire gypsum storage and disposal site. Stormwater falling on the bermed area will be directed to temporary storage areas and allowed to percolate into the ground. None will be directly discharged into any body of water. There should be no hydrologic impact on ground-water flow.

Rainwater infiltrating through the gypsum to the water table is a potential source of ground-water pollution. The permeability of the byproduct gypsum produced by the proposed Unit 4 is guaranteed by the vendor of the FGD system not to exceed 0.0002 foot per minute. The exact water quality of the FGD system leachate at site will depend on site-specific factors. Since the FGD byproduct will be gypsum, the major contributor to leachate contamination is expected to be calcium sulfate. Ground water in the area is typically high in sulfates; therefore, little impact is expected. There are presently no Class I-B Florida water quality standards for calcium sulfate, calcium, or sulfates.

A recent study by the Electric Power Research Institute evaluated the effects of storing FGD byproduct gypsum in an area of northern Florida very similar to that of the Big Bend site. Results of a twenty-month monitoring program revealed no evidence of significant degradation of ground-water quality in either the surficial or Floridan aquifers.

Impacts of Particulate Control

Bottom ash will be collected in a water-filled bottom-ash hopper and hydraulically sluiced to an earthen-diked pond. Overflow from the primary settling pond will flow by gravity to a secondary settling pond, be clarified and then be pumped back to the plant. The major portion of the bottom ash will settle in the primary settling pond. Once this pond is filled, the ash will be hydraulically dredged to an earthen-diked cell for final disposal.

Preliminary calculations using flow nets show that approximately 250 gallons per minute of water will seep out of the bottom-ash pond into the surficial aquifer. The analysis indicates that almost all of the seepage will occur on the north, south, and west sides of the pond. Normal leakage at the site area from the Floridan aquifer through the Hawthorn Formation into the surficial aquifer is estimated to be 0.0065 gallon per minute per acre. The construction of the bottom-ash pond will reverse the hydraulic gradient in the Hawthorn Formation so that 0.16 gallon per minute per acre will flow from the surficial aquifer into the Floridan aquifer directly beneath the pond. Leakage into the Floridan aquifer is predicted to be 0.013 gallon per minute per acre for the area (10 acres) adjacent to the pond where the water level will be raised in response to leakage from the pond into the surficial aquifer. Maximum leakage directly beneath the pond into the Floridan aquifer will be 0.29 and 0.13 gallon per minute from adjacent areas where the ground-water table is raised. Total leakage into the Floridan aquifer from the bottom-ash pond is predicted to be 0.42 gallon per minute.

Seepage from the bottom-ash cells will result from rainfall percolation through the material. Since the cell will be diked, rainwater in the dikes will either evaporate or percolate into the ground; none will run off. According to the hydrologic budget for Hillsborough County, approximately 40 percent of the rain falling into the cells will percolate into the ground. Leachate from the bottom-ash-disposal area is not expected to have an adverse impact on ground-water quality at the site.

The installation of a high-density polyethylene liner in the bottom-ash pond would eliminate the seepage from the pond. Similarly, lined disposal cells would not allow the percolation of rainwater through the ash into the ground water. The estimated cost of liners for the pond and cells is $2.1 million.

Unit 4 fly ash will be removed from the flue gas by electrostatic precipitation, collected in hoppers, and pneumatically transported to silos for storage and subsequent sale as a raw material for the production of portland cement. At times when it may be impossible to market Unit 4 fly ash, an ash-disposal system will be used. This system will also be used to dispose of economizer ash and pyrites removed from the coal before combustion. The solids will be sluiced from the plant to lined settling ponds. When the ponds reach the point at which they must be cleaned, a final earthen-diked disposal cell will be constructed and lined.

Leachate from the fly-ash pond can directly affect ground-water levels and quality. It is expected that the fly-ash pond will have minimal impact on the ground-water system at the site because the pond will be sealed with a liner having a very low permeability (0.0000001 centimeter per second).

Impacts of Once-Through Cooling Conventional Intake Screens for Unit 4

There are three principal concerns regarding potential impacts of once-through cooling-water systems: (1) thermal effects due to the heated discharge plume; (2) impingement (organisms being caught on the intake screens); and (3) entrainment (organisms passing through the screens and then through the cooling-water system).

Thermal Effects. The thermal impacts of Unit 4 on Tampa Bay were investigated by TECO using a predictive mathematical model. The results of earlier studies had shown that the surface area enclosed by the 2°C isotherm is 692 hectares when Units 1-3 are at 100 percent load (Figure 1-10). The new study indicated that Unit 4 at 100 percent load would increase this area to 720 hectares (Figure 1-11). Also, the surface area swept during a tidal cycle by the 2°C isotherm would increase from 923 hectares to 983 hectares owing to the addition of Unit 4. Table 1-14 compares the projected temperatures of the Unit 4 effluent at the point of discharge with the monthly ambient bay-water temperatures.

The operation of Units 1, 2, and 3 at 95 to 100 percent of their designed capacity and without the use of a dilution-assist cooling system will have an adverse thermal impact on approximately 30 hectares (74 acres) of benthic habitat in Hillsborough Bay. Including the discharge canal (16 hectares (40 acres)), a total of 46 hectares (114 acres) would suffer adverse environmental impact from the thermal discharge.

With the addition of Unit 4 to the Big Bend power plant, the current heat load to Hillsborough Bay is expected to increase by approximately 33 percent. Although temperature rises at the point of discharge will remain unchanged, the added thermal load to the bay will provide for an enlargement of the benthic area presently subject to adverse effects. Based on a linear extrapolation, the operation of Units 1-4 without dilution-assist cooling could potentially provide for an adverse impact to approximately 61 hectares (152 acres) of bay bottom.

The EPA concluded that the operation of Units 1-4 without a dilution-assist cooling system will potentially have an adverse thermal impact on this area of benthic habitat. The thermal impact, however, would not be viewed as substantial or unacceptable in terms of thermal damage to the benthic biota of Hillsborough Bay, because of the sandy, tide-swept nature of the benthic area subject to the impact and the fact that this area does not represent primary benthic habitat (i.e., seagrasses and other habitat-forming features).

Impingement. Studies were conducted at Big Bend Station during the periods 1976-1977 and 1979-1980 to determine the numbers of fish and invertebrates impinged on the intake screens of Units 1-3. Projections of impingement rates that would result from the addition of Unit 4 were also made. Based on the Applicant's Section 316 Demonstration, EPA determined that adding Unit 4 with conventional once-through cooling could increase existing impingement effects by approximately 33 percent and that impingement losses for four units are potentially adverse.

Entrainment. Several studies have also been conducted at the site to determine the extent of entrainment by Units 1-3 and to estimate the effects of entrainment by Unit 4. Estimates were made of numbers of eggs and larvae of selected representative important species that would be entrained annually by Units 1-4 if conventional intake screens were used on Unit 4. These estimates are based on abundance data collected during the 1979-1980 meroplankton studies. EPA determined that entrainment losses for four units with conventional screens at Big Bend Station are potentially adverse.

Fine-Mesh Screens on Units 3 and 4

The potential thermal impacts of the Big Bend Station discharge plume would be the same for this alternative as those described for conventional screens.

TECO constructed and tested a prototype fine-mesh-screening apparatus to determine its efficacy as an intake device to reduce entrainment effects associated with the operation of Units 1-4 with a once-through cooling system.

The prototype device appeared to be approximately 56 percent effective in screening eggs and larvae from source water. Suggested changes in the design of the spraywash system, lifting buckets, and seals are proposed as a means of substantially improving the screening efficiency of the intake device.

Fish eggs and invertebrate larvae collected from the fine-mesh screen exhibited a low level of mortality. Many of the taxa involved were species of sport and commercial value (e.g., stone crab and drum).

Fish larvae collected from the fine-mesh screens or by plankton nets for control tests exhibited a high degree of mortality. The observed mortality, however, cannot be concluded to be solely due to impingement effects of the fine-mesh screen. Testing procedures (i.e., sampling and handling) can be viewed as factors contributing to the apparent low survival of the larval organisms. The immediate return of animals upon collection from the screening device may enhance the survival of fish larvae.

The EPA determined that the placement of fine-mesh screening on the intake structures of Units 3 and 4 will minimize entrainment effects, and, thus, that the entrainment effects of Big Bend Units 1-4 will be approximately equal to the current impacts of Units 1, 2, and 3 using conventional intake technology and no dilution pumps. Impingement effects will also be reduced with this alternative. Accordingly, it is proposed that fine-mesh screens be used on the intakes of Units 3 and 4 at Big Bend.

Fine-Mesh Screens on Units 1-4

The potential thermal impacts of the discharge of heated effluent from a cooling-water system incorporating this alternative would be the same as those of a conventional circulating-water system.

The numbers of organisms impinged and entrained as a result of the operation of Units 1-4 with this alternative would be less than those attributable to the operation of Units 1-3 with conventional screens. The feasibility of backfitting fine-mesh screens to Units 1 and 2 has not been examined in detail.

Dilution Pumping

A Section 316 Demonstration for Big Bend Units 1, 2, and 3, which at the time included a dilution-assist cooling system, was evaluated by the EPA. This evaluation revealed that the location and capacity of the station's cooling-water facility were major factors in the unacceptable level of entrainment. The Applicant responded with a proposal to terminate use of the dilution-assist cooling system and to arrange for studies to assess the thermal and associated biological consequences of such action.

Results of the thermal and biological studies were evaluated by the EPA. The evaluation confirmed that a shutdown of the dilution-assist cooling system at Big Bend Station would not cause an unacceptable thermal impact on the aquatic resources of Hillsborough Bay. It also showed that such a shutdown would effect a significant reduction in the pumping requirements of the Big Bend facilities and would produce the expected reduction of 36 percent in entrainment. Based on these findings, the EPA has not approved a dilution-assist cooling system for use with Unit 4.

Freshwater Use

The operation of Big Bend Unit 4 will have an indirect impact on the freshwater resources of the Tampa Bay area. Big Bend Station Units 1, 2, and 3 are presently served by the Hillsborough County South/Central Water System for its average freshwater need of 1.1 million gallons per day. The operation of the proposed Big Bend Unit 4 will require an additional 2.1 million gallons per day of freshwater. Big Bend Station will rely on Hillsborough County to meet the additional freshwater demand of Unit 4. The County is in the process of studying its water systems and has included Big Bend Unit 4 in its long-range plans.

The design of Big Bend Unit 4 will include an expansion of the existing recycling system, permitting significant savings of freshwater. Records show that the use of recycled water at the existing facility has cut potable water consumption by 21-23 percent.

Wastewater Treatment Systems

Through the NPDES permitting process, water quality standards and standards of performance for new sources are applied to control the quantity and/or quality of the discharge of liquid effluents. Florida water quality standards are also applicable.

During the construction of Big Bend Unit 4, there will be two discharges associated with the installation of the circulating-water line: (1) construction dewatering discharge into the plant intake canal (NPDES No. 012) and (2) construction dewatering discharge into the plant discharge canal (NPDES No. 013). The point of discharge of No. 012 will be the eastern end of the intake canal. The point of discharge of No. 013 will be west of the Unit 3 condenser cooling-water discharge (NPDES No. 004), so that dewatering pumpage is not pushed into Jackson Branch during a rising tide. Since Big Bend Station and the construction site are surrounded on three sides by the waters of Hillsborough Bay (including the intake and discharge canals), the quality of the surficial ground water at the circulating-water-line excavation (i.e., that water subject to construction dewatering) is estimated to be similar to that in the intake and discharge canals.

There will be no discharge associated with the construction of the Unit 4 building and related facilities. Surface runoff will be intercepted and pumped to the wastewater-treatment pond.

Discharges from the operation of Unit 4 will include (1) once-through-cooling water (NPDES No. 008) or condenser cooling-tower blowdown, depending on which cooling alternative is selected; (2) boiler blowdown (NPDES No. 009); (3) bottom-ash-system blowdown (NPDES No. 010); and (4) FGD-system blowdown (NPDES No. 011). A schematic of the plant water flow during the operational phase is presented in Figure 1-5.

Table 1-15 lists the continuous discharge streams, their expected contaminants, and the estimated concentrations of these contaminants. The combined effluents are the bottom-ash blowdown, the boiler blowdown, the FGD bleed stream, and the once-through cooling-water discharge. The FGD-blowdown stream (70 gallons per minute) will be treated to remove suspended solids and to adjust the pH to meet applicable effluent limitations. The bottom-ash-sluice system (80 gallons per minute) will allow for the settling of suspended solids before the discharge of blowdown. Boiler blowdown (30 gallons per minute) will not require treatment to meet effluent limitations. These three streams will be combined with the circulating water (241,200 gallons per minute) a minimum of 350 feet upstream from the point of discharge to provide for complete mixing prior to discharge.

A review of the available water quality data indicate that during various periods of time the concentrations of arsenic, cadmium, chromium, copper, iron, mercury, nickel, and selenium in the ambient intake water exceeded the quality standards. In view of the fact that the concentrations of certain of the above elements in the ambient water often violate water-quality standards, TECO, on April 13, 1981, applied for a variance from those applicable water-quality standards to allow the discharge in Hillsborough Bay of the combined-waste stream from Big Bend Unit 4. This variance has been granted for a two-year period.

Predicted water quality data for Big Bend Unit 4--individual streams as well as the combined-discharge stream--is provided in Table 1-16. The data show that there will be no detectable change in water quality between the intake and the point of discharge. Although it is possible to calculate very minor variations in the combined-discharge stream, these variations cannot be measured. This prediction is based on complete mixing within 350 feet of circulating-water line prior to release in the discharge canal.

In support of the variance request, TECO considered alternative treatments of the discharge streams to remove heavy metals, assuming the individual streams could be treated to meet water-quality standards prior to mixing with the circulating water. The cost of such treatment was estimated as $1.2 to $1.8 million (1985 dollars), depending on the treatment method selected. The estimated water quality of the blowdown streams after further treatment to remove heavy metals is provided in Table 1-17.

A value of 0.2 milligram per liter has been identified as the limiting concentration for total residual oxidants (TRO) at the point of discharge. The rationale for this concentration is as follows:

1. Discharge limitations rarely exceed 0.2 milligram per liter.
2. The 96-hour LC_{50} data provided by TECO and other data available indicate that 0.2 milligram per liter falls within the range of tolerance for most organisms that could occur in the area.
3. Most of the affected organisms tested were juvenile. Generally, adult organisms can tolerate higher concentrations of chlorine, and adult species are more likely to be in the discharge canal; therefore, 0.2 milligram per liter was chosen even though it is near the upper limit of the effects range.
4. Since the discharge canal is thermally stressed and has a positive discharge flow that tends to reduce the number of juvenile organisms present, a 6.1-acre mixing zone for chlorine should not have significant adverse effects.

It is expected that this limit would not be exceeded outside of the proposed 6.1-acre mixing zone.

All inplant freshwater waste streams, both continuous and intermittent, are captured by the inplant collection system and conveyed to the wastewater-treatment ponds. The treatment of the wastewater is limited to the removal of settleable solids within the settling basins and self-neutralization within the system of ponds. A spray-irrigation system provides for land application and disposal of that portion of the wastewater within the retention pond in excess of the demand for recycled wastewater at the plant.

It is estimated that 300 gallons of water per minute seep out of the bottom of the wastewater pond into the unconfined aquifer. Approximately 0.48 gallon per minute leaks through the unconfined aquifer into the Floridan aquifer. Any increase in this seepage will cause the ground-water level in the unconfined aquifer to rise in the vicinity of the pond, thereby forming a ground-water mound.

The spray-irrigation rate is governed by pond level, seasonal conditions, and ground-water level. The overriding criterion for system operation is the avoidance of runoff from the sprayed area. When runoff is not a limiting condition, application rates of from 2 to 4 inches per week are common. This provides ultimate water disposal ranging from 254,400 to 508,800 gallons per day. It is conservatively estimated that approximately 36,000 gallons per day of recharge has been added to the normal recharge rate at the field as a result of the spray-irrigation operation. Consequently, a ground-water mound has been formed beneath the spray-irrigation field.

Certain waste streams from Big Bend Unit 4 will be channeled to the wastewater pond and sprayfield system currently used for the treatment of effluents from Units 1-3. The ground water at the Big Bend site has been designated as Class I-B in accordance with Florida water quality standards. Data on the wastewater pond and sprayfield system indicate that average concentrations of chromium, selenium, and mercury and maximum concentrations of arsenic and cadmium could exceed ground-water-quality standards. There are no data for lead concentrations, since the limit of detection for the lead test method is greater than the Florida water quality standards. Routing of these wastes to surface waters rather than allowing them to percolate into the ground water is possible. Such treatment, however, could increase the concentrations of the above elements in surface waters.

The potential potable water supply at the Big Bend site is the underlying Floridan aquifer. It is conservatively estimated that less than one-half gallon per minute will seep into the Floridan aquifer as a result of the operation of the existing wastewater-treatment system; hence, no impact on the water quality of the Floridan aquifer is expected. Moreover, the general direction of flow in the Floridan aquifer at the Big Bend site is westerly. Any well downstream of the wastewater-treatment system would have to be located between the treatment facilities and Hillsborough Bay on property owned by the Applicant. TECO has withdrawn the request for a variance from Florida water quality standards for some discharges from the wastewater pond and sprayfield system and Florida DER has designated the zone of discharge to the ground water from these sources as the area within the Big Bend site boundries.

The plant complex is situated on dredge fill consisting typically of highly permeable sand and shell material. Storm runoff can cause site flooding and could transport pollutants to surface waters. Storage areas for oils, greases, and other petroleum hydrocarbons will be constructed so that spillage from these areas will not contaminate the stormwater.

1.3.3.4 Impacts of Cooling Towers

All types of wet-mechanical-draft cooling towers considered for Unit 4 will have similar impacts on the biota of the region, but the impacts on local water resources will vary according to the source of makeup water.

The potential impacts of the thermal discharge would be the same for the mechanical-draft cooling-tower alternatives evaluated regardless of the source of makeup water. The impact of the thermal plume resulting from the discharge of blowdown from the mechanical-draft towers will be much less than that associated with the once-through cooling alternative. No detectable change in the size, shape, or temperature of the plume from Units 1-3 is expected as a result of the operation of a cooling tower for Unit 4.

The numbers of organisms impinged upon or entrained by the makeup-water intake for saltwater towers would be very small because of the volume of flow (about 24 cubic feet per second) and its location in the discharge canal. If the makeup intake were located in the intake canal, some increase in the numbers of organisms lost would result; however, the losses would still be quite small compared to those that would result from a once-through-cooling system. There would be no impingement or entrainment impacts if treated wastewater or brackish water were used for makeup.

Another issue of concern is the potential impacts of the cooling-tower alternatives on water resources. A ground-water investigation was conducted to evaluate the availability of brackish artesian water as an alternative source of cooling-tower makeup.

Further investigations would be necessary before conclusions can be reached as to the feasibility of the brackish water as a makeup source and the environmental effects of pumping such water from the aquifer. The quantities of freshwater needed for a closed-cycle system would place a great burden on the local ground-water resources. For this reason, efforts have concentrated on finding a feasible source of treated sewage effluent.

1.3.4 HUMAN FACTORS

1.3.4.1 Demography, Land Use, and Aesthetics

Baseline Conditions at Big Bend

The proposed site for Big Bend Unit 4 is approximately 10 miles south of the city of Tampa and 5 miles north of Ruskin, in Hillsborough County.

The estimated population of Hillsborough County in January 1977 was 655,600, a 33.7 percent increase over the 1970 population and a 64.8 percent increase over the 1960 population. By 2020 the county population is projected to increase to over 1.1 million.

The population center nearest to the plant site is Apollo Beach, which is just 1 mile to the south. In addition, the towns of Adamsville and North Ruskin are within 5 miles. Ruskin, south of the site on the edge of the 5-mile radius, is the only other population center within 5 miles. Several new residential subdivisions have been developed within 5 miles of the site since 1960. Population growth is projected to occur along the shoreline, along major highways, and around Gibsonton and Ruskin. The Horizon 2000 Plan calls for residential development at a density of between 2.6 and 7.5 dwelling units per acre in the area just south of Big Bend Road and west of U.S. 41. Much of the region south of Big Bend Road and east of U.S. 41 is projected to remain rural. Currently, Big Bend Station and the associated facilities are zoned industrial.

Big Bend Station is located in a primarily rural area on the eastern shore of Hillsborough Bay. Much of the area's agricultural land is used for pasture. Swamps, flood-prone areas, and ecologically sensitive coastal waters limit residential development of the area immediately adjacent to the site.

Six parks and three recreational areas are located within 5 miles of the site. Hillsborough County established these parks for the protection of animal and plant life as well as for recreational purposes.

No sites presently listed in the National Register of Historic Places or the Registry of Natural Landmarks occur within 5 miles of the Big Bend site. A cultural assessment of the area proposed for Big Bend Unit 4 and the associated facilities was conducted in 1979. A review of the Florida Master Site File revealed no archaeological or historic sites or properties within the tracts under investigation. Assessment data also led to the conclusion that the proposed development in all probability would not affect any sites listed or eligible for listing on the National Register of Historic Places.

Impacts of Construction Activities

It is estimated that an average of 514 construction workers (craft and nonmanual) will be required per year during the 3-year construction periods. A peak-construction labor force of approximately 980 persons will be needed for approximately 2 months during 1984.

A survey of local union representatives has indicated that most of the craftsmen will be from Tampa and the surrounding communities, supplemented by people from other areas during peak periods. At the peak of construction, approximately 98 construction workers are expected to migrate into Hillsborough County.

If it is assumed that each of these workers brings a family, the total number of persons relocating to the Tampa area as a direct result of construction will be 294, or less than 0.05 percent of the 1979 estimated total population of Hillsborough County. Plant construction is not expected to have an impact on local communities except for intermittent traffic congestion. Plant construction is also expected to have a negligible effect on nearby recreational facilities, in view of the previous commitment of the site and adjacent areas to industrial land use.

According to the Hillsborough Horizon 2000 Plan, Big Bend Station will be a heavy industrial area by the year 2000. Immediately adjacent lands on the north, east, and southeast have been designated for industrial use. Swamps and flood-prone areas within 5 miles of the site are expected to limit future development, however. Unit 4 is thus consistent with current and projected land-use patterns and practices, and it is generally expected that it will not adversely affect the land use of the area.

The construction of Big Bend Unit 4 will not cause a relocation or direct physical disturbance of any historically or culturally significant features in Hillsborough County.

The aesthetic quality of the site and surrounding area will not change dramatically during construction. Currently, 80 percent of the Big Bend site has been influenced by human activity. The area's landscape is dominated by the existing structures on the site. The additions will not significantly increase the visual or aesthetic impact of Units 1, 2, and 3 because of the size of the existing structures and the compatibility of the proposed unit with the industrial nature of the area.

Indirect impacts associated with Unit 4 construction will include the demands placed on the area by the relocation of construction workers. As the number of relocating workers is expected to be small, the induced demands and the indirect impacts on demography, land use, and aesthetics are not expected to be significant.

Impacts of Operation

The aspects of the operation of Unit 4 that could have an impact on demography, land use, and aesthetics are those related to the air-pollution-control systems.

The development of the FGD-waste-disposal areas is expected to have a long-term visual impact. The planting of vegetative screening around its periphery will effectively screen the fill from most viewing areas. In addition, upon reaching fill capacity, each parcel will be revegetated with native plant species to minimize the visual impact of the area. At the end of the life of Unit 4, it is expected that the disposal area will be dedicated to use as public open space.

The aesthetic impact of the fly-ash-disposal area is similar to that of the FGD storage and disposal area.

Impacts of Cooling Towers

Unlike once-through cooling options, the use of a cooling tower with saltwater makeup would require additional land area. Aside from the visibility of the drift plume, the aesthetic impact of the saltwater cooling tower should not be significant. In addition, salt drift from the towers could limit the agricultural use of adjacent land to only those crops that are not salt-sensitive.

A freshwater or brackish water cooling tower would be expected to have the same dimensions as a saltwater cooling tower, and thus the same commitment of land resources and similar aesthetic impacts. The use of freshwater or brackish water makeup, however, would minimize salt deposition on adjacent and nearby agricultural vegetation.

1.3.4.2 Socioeconomics

Baseline Conditions at Big Bend

Total personal income in Hillsborough County rose from approximately $1.69 billion in 1970 to over $3.5 billion in 1977, while the per capita income rose from $3,416 to $6,145. Per capita income in the Tampa-St. Petersburg Standard Metropolitan Statistical Area (Hillsborough and Pinellas Counties) is projected to increase to $12,100 by the year 2020. This rate of increase is greater than that projected for the United States but lower than the projection for the State.

The county's labor force averaged 272,519 persons in 1978. The unemployment rate for the year was 5.5 percent, which compared favorably with the State's unemployment rate of 6.6 percent and the national rate of 6 percent. Employment is projected to increase by about 50 percent over the 1980-2020 period, reaching a total of 755,400 persons. Population gains are forecast to outstrip the expansion in employment during this same period, growing over 77 percent by 2020.

The majority of the county's workers are employed in the nonmanufacturing sectors, which consist of agricultural services and forestry; contract construction; transportation, utilities, and communications; trade (wholesale and retail); finance, insurance, and real estate; services; mining; and civil government. Of these industries, trade employs the most workers, followed by services and manufacturing. In 1977, manufacturing contributed $380,322,000 to the county's total annual payroll of $1.8 billion. Other major contributing business sectors were retail trade services and transportation.

During the 1977-1978 fiscal year, total revenues accruing to the local governments within Hillsborough County amounted to $410,202,864. This figure includes the revenues of Plant City ($7,396,653), Temple Terrace ($9,456,878), Tampa ($161,824,626), the Hillsborough Industrial Special District ($57,747,618), and Hillsborough County itself ($173,777,089). Taxes were the source of over 24 percent of the total revenue collected within the county during 1977-1978. Of the total revenue, 77 percent was raised from property taxes, 15 percent was from utility services taxes, and 8 percent was from franchise taxes.

Hillsborough County's total housing stock rose from 81,000 units in 1950 to approximately 234,000 units in 1976. From 1976 to 1978, 10,909 single-family units and 4,251 apartment units were added to the county's housing stock. About 13,000 of the county's 1976-1977 total of 234,000 housing units were vacant. The majority of these vacancies were among multifamily units. The average vacancy rate for all multifamily units was 11 percent.

Impacts of Construction Activities

An estimated $11,800,000 (expressed in 1982 dollars) will be paid to construction personnel over the 3-year construction period. Of this total, an estimated $10,018,200 (1982 dollars) will constitute disposable income. The expenditure of most of this money in the Tampa area will substantially benefit the local economy.

Since the relocation of construction workers and their families should produce only a small increase in the overall demand for housing and community services, no special provisions for housing, education, or community facilities are expected.

Local taxpayers are expected to predominate among construction workers using community roads, schools, and health services. Moreover, taxes on Big Bend Unit 4 will compensate Hillsborough County for the additional stress on county services attributable to the relocation of construction personnel. The total annual property tax payments to Hillsborough County for Unit 4 will be approximately $3,700,000.

The employment of a daily average of approximately 514 construction workers over the 3-year construction period for Unit 4 will have the effect of increasing the demand for goods and services in the areas where the workers spend their wages and salaries. This change will have a "multiplier effect" in that new jobs will be created to provide the additional goods and services. The magnitude of this multiplier effect may be insignificant, however, since (1) the limited duration of the overall construction and peak construction work periods--3 years and 2 months, respectively--will discourage capital-intensive investment to meet service demands; and (2) 90 percent of the construction workers are estimated to reside within the region and may be presumed to be already contributing to the overall service demands of the region. Assuming a maximum of 75 service jobs for every 100 construction employees, 386 construction-induced jobs will be created.

The spending of disposable income during the construction period will also have a multiplier effect, since those receiving the dollars that the project workers spend will respend a portion of their income in the area. As with induced employment, however, the magnitude of this multiplier effect will be tempered by the limited duration of the overall construction and peak-construction work periods.

Impacts of Operation

The operational impact of Big Bend Unit 4 on socioeconomics will be attributable mainly to the air pollution control systems.

Both the capital and annual costs of TECO's proposed wet-limestone-scrubbing system are lower than those of alternative sulfur-dioxide-control systems considered, except for the lime-FGD system, provided that a gypsum-grade material is produced and marketed. Assuming capital and annual costs of the sulfur-dioxide-control technology are indicative of (1) the revenue potentially derived through taxes on the facility and (2) the annual demand for labor, supplies, and services, the proposed sulfur-dioxide-control system would result in a comparatively small economic loss to the local economy. This loss could be more than offset, however, by the development and sale of a gypsum-grade material.

Of the alternative sulfur-dioxide-control technologies, the wet-limestone-scrubbing system has the least water requirements. Approximately 1.1 million gallons per day of makeup water will be required for the proposed system. Current plans are to use water from the Hillsborough County South-Central System. In order to minimize the demand on this municipal system, TECO has been included in the Hillsborough County South 201 Facility Plan for the reuse of sewage effluent. According to this plan, 1.3 million gallons per day will be made available for Big Bend in 1986.

The fly ash produced through the use of an electrostatic precipitator can be sold as a raw material for the production of cement. The marketability of the fly ash for cement production is sensitive to the economic conditions within the area and the need for additional construction. The sale of fly ash as a raw material is considered a source of indirect economic benefit to the area.

Impacts of Cooling Towers

The main socioeconomic implications of a decision to use mechanical-draft cooling towers with saltwater makeup are (1) economic growth associated with the construction of additional plant facilities and (2) damage to nearby agricultural vegetation as a result of salt deposition. Cooling tower construction would contribute to the economic vitality of the region by virtue of the increased property tax levy on Big Bend Station as well as the influx of additional construction personnel. This economic benefit could be offset, however, by a loss in local agricultural productivity as the result of salt deposition.

Cooling towers with treated wastewater makeup would be of greater economic benefit to the region than those with saltwater makeup, since a pipeline would have to be constructed to transport treated wastewater to Big Bend Station. The construction of this pipeline would require the hiring of additional construction workers.

In contrast with the saltwater-makeup cooling tower, this alternative would result in much less potential damage to agricultural vegetation by salt deposition. This advantage could be offset, however, by economic problems related to the logistics of pipeline construction.

1.3.4.3 Transportation

Baseline Conditions at Big Bend

Federal, State, and county highways are the primary transportation arteries in Hillsborough County. In the southern half of the county, the only primary highways are U.S. 41 and U.S. 301, both of which parallel the Tampa Bay coastline. These routes pass east of Big Bend Station at a distance of 1.5 and 4 miles, respectively.

In the Horizon 2000 transportation circulation plan, the county has projected an extension of I-75 to the south. Upon completion of the extension, this four-lane expressway will run between U.S. 41 and U.S. 301 and will pass approximately 2-2/3 miles east of Big Bend Station. U.S. 41 and Big Bend Road provide auto and truck access to the plant site.

As with highways, railroad tracks in the southern half of Hillsborough county are limited, and only two stretches of track, running in a north-south direction, connect the county with its southern neighbor, Manatee County. One of these two tracks passes 1.5 miles to the east of Big Bend Station, and spurs from this line serve the station.

The Port of Tampa is the eighth largest port in the United States. The major commodities flowing through it are phosphate rock, petroleum, and sulfur. General cargo accounted for only 3 percent of the total tonnage in 1978 and for 24.4 percent of the port's economic value. The total tonnage passing through the port increased from 41.5 million tons in 1974 to over 48 million tons in 1978. Total tonnage is projected to reach 70 million tons by 1990 and 97 million tons by the year 2000 and port facilities will have to be upgraded and expanded to accommodate the additional tonnage.

Impacts of Construction Activities

The most significant impact associated with the construction of Unit 4 will be the movement of workers, materials, and equipment to and from Big Bend Station. Most of the traffic will access the station from the north via U.S. 41. An average of 1100 vehicles per day (550 in each direction) will use the site during the peak-construction period in 1984. Of these 550 vehicles, an estimated 516 will be employee vehicles, 12 will be visitor vehicles, and 22 will be trucks.

U.S. 41 will generally be able to accommodate the additional construction-related traffic. During the morning and evening periods of peak traffic flow, however, intermittent traffic congestion may occur at the intersection of Big Bend Road and U.S. 41, and in the residential development of Adamsville. The community of Apollo Beach may also experience periodic traffic congestion because of its proximity to the site.

Construction materials will be transported to the site by truck, rail, and barge. As with truck transportation, the impact of rail and barge transportation is considered to be negligible.

The existing Big Bend Port can accommodate additional barges. The deepening of Big Bend Channel to as much as 43 feet is currently under study by the U.S. Army Corps of Engineers.

Impacts of Operation

The operational impact of the proposed unit on transportation will be primarily in the areas of coal handling, sulfur dioxide control, and particulate control.

The existing Big Bend Units 1, 2, and 3 burn coal delivered to the site by barge, as will Unit 4. No modifications to the dock or to the unloading facilities are contemplated in connection with the construction of Unit 4. The total annual fuel requirement for Unit 4 is estimated to be 950,000 tons. The additional barge traffic required to supply fuel for Unit 4 will amount to less than one delivery per week, with an average shipment of approximately 25,000 metric tons.

If the gypsum byproduct of the FGD process is marketed commercially, approximately 210,000 tons of this byproduct may be transported from Big Bend Station to a local wallboard-manufacturing concern. If 10-ton trucks are used for the continuous shipment of gypsum to a local manufacturer, approximately 66 truck shipments per day will take place. While this volume of offsite truck traffic will not have a significant impact on the area's transportation network, the continuous shipments could cause intermittent traffic congestion, and, depending on shipment procedures and routes, could add to the problem of localized dust and noise.

The major offsite transportation impact attributable to the use of the particulate-control system will be the shipment of fly ash for sale as a raw material in cement production. Given an annual production rate of 102,400 tons from Unit 4, and the use of 10-ton trucks for continuous shipment, a maximum of approximately 29 truck shipments per day will be required. The combination of these 29 shipments and the estimated 66 shipments of FGD by-product gypsum (a total of 95 trucks per day) will not overtax the existing transportation network, but occasional local traffic congestion and additional dust and noise can be expected.

Impacts of Cooling Towers

All of the cooling-tower alternatives considered in detail have a potential for the generation of localized fogging under certain atmospheric conditions. Given the distance of the station from the nearest major highway facility (i.e., U.S. 41, approximately 1.5 miles to the east), however, the potential for fogging of a major thoroughfare appears to be very limited.

Impacts of Once-Through Cooling-Water Systems

All alternative once-through cooling-water systems are equivalent in their potential for fogging. In the absence of detailed information, it may be assumed that the potential for additional fogging due to Unit 4 is slight, and that in all probability fogging would affect only water transportation in and around the station. The once-through systems would produce less fogging than would cooling towers.

1.3.5 SENSITIVE SPECIES, HABITATS, AND AREAS

1.3.5.1 Baseline Conditions at Big Bend

Special-Status Species (Wildlife)

A number of special-status species reportedly use the Big Bend site and vicinity, and these species could be affected by the construction and operation of the proposed Unit 4. Those species listed by the U.S. Fish and Wildlife Service as endangered or threatened are identified below. Information on Florida special-status species (endangered, threatened, rare, and of special concern), as designated by the Florida Game and Fresh Water Fish Commission and the Florida Committee on Rare and Endangered Plants and Animals, is presented in Table 1-18.

Brown Pelican (Federal status: endangered; Florida status: threatened). Brown pelicans have been regularly observed flying near the site and feeding near the mangrove swamp south of the discharge canal. They are expected to occur in the vicinity on a daily basis owing to the presence of at least two county rookeries. No brown pelicans are believed to nest at the site.

Southern Bald Eagle (Federal status: endangered; Florida status: threatened). Bald eagles have not been observed on the site, but several pairs regularly nest in Hillsborough County and wandering or hunting individuals could occasionally use shore and aquatic habitats at Big Bend.

West Indian Manatee (Federal status: endangered; Florida status: endangered). There are two habitats designated as critical for the manatee in the area of Big Bend: the Alafia and Little Manatee Rivers. Individuals have also been frequently reported elsewhere along the eastern shore of Tampa Bay. In a study sponsored by the Applicant, the Big Bend power station ranked second in importance to the Gardinier Phosphate Plant on the Alafia River as a warm-water refuge in the area. As many as 10 individuals have been observed at one time in the Big Bend discharge canal.

Sea Turtles (Federal status: endangered; Florida status: endangered). No sea turtles have been reported on or near the site during the biological surveys conducted by the Applicant. Each of the four species (Atlantic loggerhead, Atlantic green, Atlantic leatherback, and Atlantic Ridley) may occur rarely near the site in Tampa Bay. None of these species is expected to nest at the site.

Peregrine Falcon (Federal status: endangered; Florida status: endangered). This species can be expected to occur as a very rare migrant. It may use beach areas and mangrove swamps along the Tampa Bay shoreline to prey on shorebirds.

Eastern Indigo Snake (Federal status: threatened; Florida status: threatened). Two individuals of this species were observed during field surveys on the site in the *Myrica*-*Baccharis* association. This species is expected to use this and possibly other habitats on the site for breeding, food, and cover.

American Alligator (Federal status: threatened; Florida status: species of special concern). No alligators have been observed on the site, although they have been reported elsewhere along the eastern shore of Tampa Bay. The preferred habitats of this species (large freshwater bodies, swamps, and marshes) do not occur on the site, but alligators could use the brackish habitats along the edge of the mangrove swamp as well as the ditches and small ponds found in the area.

Sensitive Habitats

Two sensitive habitats can be identified on or near the site: mangrove swamp and seagrasses.

Mangrove Area. A mangrove community forms a distinct vegetational zone along the southwestern coastal portion of the site where tidal flushing occurs. This is the oldest and least disturbed plant community at the site. It contains three arborescent species: the white, red, and black mangrove. Stands of mangroves have several important ecological roles: they produce organic matter in great quantity, by accumulating sediment they extend and protect coastlines, and they provide protection and habitat for other plants and animals.

Seagrasses. It has been estimated that benthic seagrasses and associated macroalgae cover approximately 21,000 acres on the bottom of Tampa Bay. However, surveys conducted for the Applicant in the vicinity of Big Bend indicate that seagrass coverage is limited in this area. Only one seagrass species (*Ruppia maritima*) was found in the embayment area south of the discharge canal, and both coverage and density were very low. A second area near the former dilution pump intake contained sparse growth of *Halodule wrightii* during some periods of the year.

1.3.5.2 Impacts of Construction

Special-Status Species

The only special-status species that could be affected by construction activities is the indigo snake. It is expected that the commitment of about 218 acres of the site to the ash ponds and the gypsum storage and disposal area could result in the loss of habitat for this species. Further loss of habitat would occur if a cooling tower is constructed at Big Bend.

No alligators have been reported at the site. Accordingly, the loss of the small wetland areas and the rerouting of Jackson Branch are not expected to affect this species since these habitats are presently only marginally suitable for alligators.

Sensitive Habitats

The construction of the intake and discharge structures will affect only small areas in the intake and discharge canals. No impact is expected on the limited areas of seagrasses in the vicinity of the site.

The layout for the proposed generating unit has been planned in such a manner that the mangrove areas will not be affected by construction activities. If cooling towers are required, they will be located near the mangrove areas. However, their placement could be such that impacts on the mangroves will be minimized.

1.3.5.3 Impacts of Operation

It is anticipated that no special-status species will be adversely affected by the operation of Unit 4. The U.S. Fish and Wildlife Service, during formal consultation on the project pursuant to Section 7 of the Endangered Species Act, has concurred with this conclusion.

There is a possible beneficial effect of adding a fourth unit with once-through cooling at Big Bend Station: the potential for cold shock to manatees as a result of station shutdown would be reduced. The probability of a simultaneous shutdown of four generating units is lower than that of a similar shutdown of only three.

The only sensitive habitat that could be affected by this system is the mangrove area. Leachate from the unlined bottom-ash pond will enter the ground water and migrate toward the Bay. There is not sufficient information available to determine if this leachate can be taken up by the mangrove trees or if it will adversely affect them.

1.3.5.4 IMPACTS OF COOLING TOWERS

Special-Status Species

Potential impacts to special-status species from cooling-tower operation include the collision of the three bird species with the structure, habitat loss for the indigo snake and the alligator, and the effects of increased noise levels on all of the species.

Sensitive Habitats

The preemption of land for the cooling tower may affect the sensitive mangrove area and associated marshes. The tower could be located in such a way as to minimize any impact on this area.

In the case of brackish-water cooling towers, the withdrawal of makeup water from deep artesian aquifers may affect the quality and quantity of fresh water in shallow artesian aquifers. This, in turn, may affect vegetation in sensitive habitats on the site.

The use of freshwater cooling towers could also affect sensitive areas. It is expected that freshwater withdrawal for makeup will seriously overburden local ground-water resources, which will in turn affect vegetation in sensitive habitats on the site. Accordingly, sources of sewage effluent to serve as cooling-tower freshwater makeup have been investigated.

Table 1-6. National and State of Florida ambient air quality standards applicable to the proposed site, Hillsborough County, Florida

Pollutant	Averaging time	National[a]		Florida[b]
		Primary standard	Secondary standard	
Suspended particulate matter	Annual geometric mean	75 $\mu g/m^3$	60 $\mu g/m^3$	60 $\mu g/m^3$
	24-hour maximum	260 $\mu g/m^3$	150 $\mu g/m^{3(c)}$	150 $\mu g/m^{3(c)}$
Sulfur dioxide	Annual arithmetic mean	80 $\mu g/m^3$	NA	60 $\mu g/m^3$
	24-hour maximum	365 $\mu g/m^{3(c)}$	NA	260 $\mu g/m^{3(c)}$
	3-hour maximum	NA	1,300 $\mu g/m^{3(c)}$	1,300 $\mu g/m^{3(c)}$
Carbon monoxide	8-hour maximum	9 ppm^c	9 ppm^c	9 ppm^c
	1-hour maximum	35 ppm^c	35 ppm^c	35 ppm^c
Hydrocarbons	3-hour maximum (6 to 9 a.m.)	0.24 ppm^c	0.24 ppm^c	0.24 ppm^c
Nitrogen dioxide	Annual arithmetic mean	100 $\mu g/m^3$	100 $\mu g/m^3$	100 $\mu g/m^3$
Ozone	1-hour maximum	120 ppb^c	120 ppb^c	80 ppb^c

Abbreviations:
g/m^3 = micrograms per cubic meter.
NA = not applicable.
ppm = parts per million.
ppb = parts per billion.

[a] Code of Federal Regulations, Title 40, Part 50, 1976, and FDER (1972).
[b] Florida Administrative Code, Chapter 17-2.
[c] Concentration not to be exceeded more than once per year.

Table 1-7. Federal and State of Florida prevention of significant deterioration allowable increments (micrograms per cubic meter)

Pollutant/averaging time	Class I	Class II	Class III
Particulate matter			
Annual geometric mean	5	19	37
24-hour maximum[a]	10	37	75
Sulfur dioxide			
Annual arithmetic mean	2	20	40
24-hour maximum[a]	5	91	182
3-hour maximum[a]	25	512	700

[a] Increment can be exceeded once per year.

Table 1-8. Maximum air-quality impacts (micrograms per cubic meter) at the Big Bend site with Unit 4 operating

Case	Annual SO_2	Annual TSP	24-hour[a] SO_2	24-hour[a] TSP	3-hour SO_2
Attainment-area impacts					
Big Bend Unit 4 only	≪1	≪1	34.2	0.9	163
Big Bend Units 1-4	8.5	0.2	185	3.7	1087
With all interacting sources	18.5	69.2[b]	82	128.1[c]	992
State of Florida AAQS	60	60	260	150	1300
Nonattainment-area impacts[d]					
Big Bend Unit 4 only	≪1	≪1	4	0.4	17
Significance-of-impact level	1	1	5	5	25

Abbreviations:

SO_2 = sulfur dioxide.
TSP = total suspended particulates.
AAQS = ambient-air-quality standard.

[a] Not to be exceeded more than once per year.

[b] Includes background concentration of 35 micrograms per cubic meter. Modeling violation only.

[c] Includes background concentration of 55 micrograms per cubic meter.

[d] Sulfur dioxide impact at Pinellas County nonattainment area and impact of total suspended particulates at Hillsborough County nonattainment area.

Table 1-9. FDER prevention of significant deterioration maximum increment consumption (micrograms per cubic meter) at the Big Bend site

Case	Annual[a]		24-hour[b]		3-hour[b]
	SO_2	TSP	SO_2	TSP	SO_2
Big Bend Units 1-4 only	0.0	0.0	-4.4	0.3	67.7
With all interacting sources					
Projected	8.0	34.3	20.3	3.7	824.1
Baseline	21.0	10.0	24.7	0.0	756.4
Increment consumption	-13.1	24.3[d]	-4.4	3.7	67.7
EPA allowable Class II increment	20	19	91	37	512

Abbreviations:

FDER = Florida Department of Environmental Regulations.
SO_2 = sulfur dioxide.
TSP = total suspended particulates.
EPA = U.S. Environmental Protection Agency.

[a] Includes all sources within a 50-kilometer radius.

[b] Includes all sources within a 15-kilometer radius plus other major sources.

[c] Modeling violation only.

Note: Minus values indicate air-quality improvement.

Table 1-10. Water-quality data for Hillsborough Bay, Florida[a],[b]

Parameter	Annual average ambient concentration			Florida Class III water standard[f]	Average composition of seawater[g]
	1972[c]	1978[d]	1979[e]		
Alkalinity, total	102.4				
Biochemical oxygen demand	1.8	3.1	2.9		
Calcium	335				413
Chloride	15,880				19,353
Chromium (total)	≤0.01			≤0.05[h]	
Color (platinum color units)	9.5	13.3	17.1		
Conductivity (μmhos/cm)	37,510	39,535	39,258		
Copper	≤0.01			≤0.015	≤0.002
Effective light penetration (inches)	61.7	32.4	32.2		
Fluoride	2.4	2.4		≤5.0	1
Hardness	4,494				
Iron, total	0.01			≤0.3	≤0.001
Lead, dissolved	≤0.01			≤0.05	
Magnesium	967				1,294
Nitrogen					
Total Kjeldahl	0.40	0.13	0.06		0.02
Total nitrate	0.05	0.02	0.03		
Ammonia	0.01	0.03	0.04		
Oxygen, dissolved	6.37	7.2	7.0	≥4.0	
pH (standard units)	8.02			6.5–8.5	8.1
Phosphorus, dissolved orthophosphate	1.89	1.22	1.07		0.073
Potassium, dissolved	272.6				387
Salinity (parts per thousand)	28.9	24.9	24.7		
Sodium, dissolved	8,382				10,760
Solids, suspended	13.2	42.6	61.0		
Sulfate (as SO_4)	2,098				2,712
Sulfide	0.03				
Turbidity (Jackson units)	4.7	5.9	4.6	50	
Water temperature (°C)	24.0	22.4	24.1		
Zinc	≤0.01			≤1.0	≤0.05

Abbreviations:

μmhos/cm = micromhos per centimeter.

SO_4 = sulfate.

[a] Average values from four Hillsborough County Environmental Protection Commission sampling stations (Nos. 9, 73, 80, 81) in Hillsborough Bay near the Big Bend Station.

[b] Values in milligrams per liter unless otherwise indicated.

[c] Hillsborough County Environmental Protection Commission (1973).

[d] Hillsborough County Environmental Protection Commission (1979).

[e] Hillsborough County Environmental Protection Commission (1980).

[f] Applicable to most of Hillsborough Bay.

[g] Martin (1970).

[h] After reasonable mixing of discharge in receiving water.

Table 1-11. Intake cooling-water quality at Big Bend Station[a]

Parameter	Minimum	Average	Maximum
pH[b,c,d]	7.3	--	8.5
Alkalinity, as $CaCO_3$[b]	102	154.2	300
Total solids[b]	23,550	25,199	26,580
Total suspended solids[f]	16.3	24.2	44.3
Nitrogen, nitrate as N[b]	<0.05	0.05	0.05
Phosphorus, total as P[b]	0.9	2.5	3.3
Sulfate, as SO_4[c,d]	1850	1892	1965
Phosphate[e]	0.667	0.768	0.922
Organic phosphorus[e]	0.005	0.169	0.206
Ammonia[e]	0.04	0.07	0.08
Nitrite (NO_2)[e]	0.005	0.005	0.006
Nitrate (NO_3)[e]	0.005	0.023	0.046
Bromide[c]	0.71	1.52	2.98
Chloride[b,c]	8326	12,774	19,813
Fluoride[b,c,d]	1.2	2.0	5.3
Aluminum[c]	<0.10	0.22	0.38
Antimony[c]	<0.2	0.5	0.8
Arsenic[c]	0.124	0.204	0.293
Beryllium[c]	<0.005	0.012	0.019
Cadmium[e]	0.001	0.001	0.001
Calcium[c]	116	276	330
Chromium[e]	0.006	0.022	0.045
Copper[e]	0.004	0.008	0.013
Iron[e]	0.01	0.05	0.08
Lead[e]	0.01	0.01	0.01
Magnesium[b,c]	122	407	905
Manganese[e]	0.01	0.02	0.04
Mercury[e]	0.0001	0.0001	0.0002
Nickel[e]	0.004	0.005	0.01
Selenium[c]	0.129	0.281	0.565
Potassium[b,c]	204	278	301
Sodium[b,c]	4550	7150	7600
Thallium[c]	<0.1	0.15	0.2
Oil and grease[e]	<1.0	1.5	1.9
Zinc[e]	0.007	0.008	0.011

Abbreviations:
$CaCO_3$ = calcium carbonate.
N = nitrogen.
P = phosphorus.
SO_4 = sulfate.

[a] All except pH data in milligrams per liter.

[b] Water-quality data for period April 29, 1973, through May 5, 1973, Stone & Webster Engineering Corporation.

[c] Water-quality data for period October 15, 1979, through December 3, 1979, Tampa Electric Company Central Testing Laboratory.

[d] Water-quality data for June 26, 1979, Thorton Laboratories, Inc.

[e] 316 Demonstration - BB4, Fine Mesh Screen Study Report, Tampa Electric Company, November 1980, Station 1. Water-quality data from six samples collected during period July-September 1980.

Table 1-12. Water quality of site ground water and suggested EPA standards[a]

Parameter	Surficial aquifer at site, March 1976[b]				Floridan aquifer[c]		EPA standards[d]
	West well	East well	South well	North well	1953	1974	
Phosphate, total	4.13	3.15	3.6	3.43			
Silica	47.9	45.4	14.8	44.2	21	28	
Calcium	692	155	176	1116	170	170	
Magnesium	173	51	53	384	65	52	
Sodium	10,000	18	17	300		50	
Potassium	1.9	0.5	1.6	1.4		3.1	
Iron, total	1.46	0.64	0.66	0.81	0.28	0.10	
Iron, dissolved	0.2	0.14	0.40	0.36			
Nickel	0.0	0.0	0.0	0.0			
Copper	0.01	0.01	0.01	0.01			1.0
Cadmium[e]	0.01		0.1	<0.01			0.01
Chromium	6.6	9.9	5.0	7.9			0.05
Lead[e]	<0.05		<0.05	<0.05			0.05
Mercury[e]	<0.002		<0.002	<0.002			
Selenium[e]	<0.5		<0.5	<0.5			0.01
Zinc	0.45	0.25	0.17	0.68			6.0
Manganese	0.12	0.18	0.18	0.24			0.05
Vanadium[e]	<1		<1	<1			
Sulfate	93.2	102.8	82.7	180.7	510	450	250
Chloride	2570	35	59	3317	88	100	250
Bicarbonate					172	173	
Nitrogen	0.56	0.89	0.22	0.78			
Nitrates	2.6	4.6	2.2	3.75			45
Arsenic[e]	0.28		0.05	0.06			
Bromine	8.6	0.1	0	12.5			
Phosphorus	0.04	0.22	0.2	0.08	0.4	0.6	
Biological oxygen demand	0	0	0	0			
Total dissolved solids	3641	4789	627	4329	1080	1000	500
Total suspended solids	50	35	14	59			
pH	7.00	6.96	8.35	6.4	7.3	7.3	
Oil and grease	0	0	0	0			
Turbidity (Ftu)	28	24	32	40			

Abbreviations:
EPA = U.S. Environmental Protection Agency.
Ftu = Formazin turbidity units.

[a] All data in parts per million unless otherwise indicated.
[b] Environmental Associates, Inc., analyses dated March 10, 1976.
[c] Duerr (1979).
[d] EPA standards for drinking water, primary and secondary.
[e] Interscience Associates, Inc., analyses dated December 15, 1975.

Table 1-13. Summary of water-quality data for the Floridan aquifer

Parameter	Number of wells	Maximum	Minimum	Median
Chloride, mg/ℓ	90	3300	1	20
Sulfate, mg/ℓ	87	990	0	235
Hardness (Ca, Mg), mg/ℓ	52	2100	150	450
Specific conductance, μmhos	87	10,900	220	840
Total dissolved solids,[a] mg/ℓ	87	8500	190	605

Abbreviations:
mg/ℓ = milligrams per liter.
Ca = calcium.
Mg = magnesium.
μmhos = micromhos.

[a] Total dissolved solids as a function of conductivity.

Table 1-14. Comparison of temperatures of the effluent from Unit 4 at the outfall with seasonal ambient water temperatures for the once-through cooling alternative

Season/month	Ambient water temperature[a] (°F)			Discharge-water temperature (°F)		
	Maximum	Minimum	Average	Maximum	Minimum	Average
Winter						
January	66	54	59.6	83	71	76.6
February	63	50	57.9	80	67	74.9
Summer						
March	75	58	66.4	82	75	83.4
April	85	67	76.8	102	84	93.8
May	85	73	80.0	102	90	97.0
June	89	81	85.6	106	98	102.6
July	94	82	87.2	111	99	104.2
August	90	79	86.1	107	96	103.1
September	88	82	85.4	105	99	102.4
October	84	71	76.9	101	88	93.9
Winter						
November	79	67	73.4	96	84	90.4
December	77	62	68.7	94	79	85.7

[a] Intake cooling-water data for 1978.

Table 1-15. Continuous-discharge stream water quality[a] (Sheet 1 of 2)

Parameter	Intake cooling-water concentration[b] Average	Minimum	Maximum	City water concentration[c]	Boiler blowdown	Bottom-ash blowdown[d]	FGD system blowdown[e]	Combined effluents[f]	Florida Class III WQ standard
Flow (gpm)	241,000				30	80	70 (max.)	241,180	
Alkalinity	154.2	102	300	168					
Total solids	25,199	23,550	26,580	500	10	500 (min.)	91,300		
Total suspended solids	24.2	16.3	44.3	20	4	30	30		
Nitrate nitrogen	0.05	<0.05	0.05	<0.05		<0.05	<0.05		
Phosphorus	2.5	0.90	3.3	<0.1		<0.01	<0.10		
Sulfate	1892	1850	1965	44		44	55,700	1980	
Phosphate	0.768	0.667	0.922						
Organic phosphorus	0.169	0.005	0.206						
Ammonia	0.07	0.04	0.08		2				0.001[g]
Nitrite	0.005	0.005	0.006						
Nitrate	0.023	0.005	0.046						
Bromide	1.52	0.071	2.98	0.48		0.48	0.48	2.9781	Bromine, 0.1; bromates, 100
Chlorine								<0.2 FAC	<0.01 TRC
Chloride	12,774	8,326	19,813	23		23	26,200	19,806	Maximum 10% above background
Fluoride	2.0	1.2	5.3	0.5		0.50	0.50	5.2964	5.0
Aluminum	0.22	<0.1	0.38						1.5
Antimony	0.50	<0.2	0.80			(h)			0.2
Arsenic	0.204	0.124	0.293		0.193	0.02	0.250	0.2929	0.05
Beryllium	0.012	<0.005	0.019		<0.005	(h)	<0.02	0.0190	
Cadmium	0.001	0.001	0.001		<0.005	(h)	0.01	0.0010	0.005
Calcium	276	116	330	70		70	0	330	(i)
Chromium	0.022	0.006	0.045	<0.05	0.065	0.01	0.03	0.0450	
Copper	0.008	0.004	0.013	<0.05	1[j]	0.003	0.06	0.0132	0.015
Iron	0.05	0.01	0.08	0.05	1[j]	0.71	0.05	0.0806	0.3
pH	7.3–8.5	7.3	8.5	7.8	8.5–9.0	8.4	6.5–7.0	8.0	6.5–8.5
Lead	0.01	0.01	0.01		<0.1	0.005	0.05	0.0100	0.05
Magnesium	407	122	905	28			2300	911	
Manganese	0.02	0.01	0.04	0.05		0.24	0.06	0.0400	
Mercury	0.0001	0.0001	0.0002		0.007	(h)	<0.0002	0.0002	0.0001
Nickel	0.005	0.004	0.01	0.05	0.096	0.02	0.03	0.0101	0.1
Selenium	0.281	0.129	0.565		0.032	(h)	0.009	0.5646	0.025
Potassium	278	204	301	2.1			2.1		
Sodium	7150	4550	7600	15			2200	7595	
Thallium	0.15	<0.1	0.2			(h)	0.15		
Zinc	0.008	0.007	0.011	2.0	0.05	0.05	0.240	0.0126	1.0
Oil and grease	1.5	<1.0	1.9	<1	5	15	20	1.9093	<5
Vanadium				<0.001			<0.001		
Silver						(h)			0.00005
Sulfite							4800	1.17	

Note: See abbreviations and footnotes at end of table.

Table 1-15. Continuous-discharge stream water quality[a] (Sheet 2 of 2)

Abbreviations:
FGD = flue-gas desulfurization.
WQ = water quality.
gpm = gallons per minute.
FAC = Florida Administrative Code.
TRC = total residual chlorine.

[a] All concentrations in milligrams per liter unless otherwise indicated.

[b] Data were obtained from the following five sources, as noted in the U.S. Environmental Protection Agency NPDES permit application:

1. Water-quality data for the period April 29, 1973, through May 5, 1973, Stone & Webster Engineering Corporation.
2. Water-quality data for October 15, 1979, through December 3, 1979, Tampa Electric Company Central Testing Laboratory.
3. Water-quality data for June 26, 1979, Thorton Laboratories, Inc.
4. TECO (1980d).

[c] Analytical results for city water taken at Sample Point 13 on April 29, 1973 (24-hour composite values).

[d] Values reflect effluent concentrations from bottom-ash pond at plant burning southern Illinois coal. Treatability of Ash Settling Pond Effluents, Utility Water Act Group (1979).

[e] Values reflect estimated concentrations after treatment. Values estimated for "combined effluent" concentrations are based on before-treatment concentrations for conservative estimates.

[f] Combined effluents were calculated from maximum intake-water concentrations.

[g] Standards for elemental phosphorus.

[h] Less than minimum quantifiable concentration from Treatability of Ash Settling Pond Effluents, Utility Water Act Group (1979).

[i] The chromium standard is 1.0 milligram per liter total and 0.05 milligram per liter after reasonable mixing of discharge in receiving water.

[j] Maximum value. Estimated values are 0.04 milligram per liter for copper and 0.001 milligram per liter for iron.

Table 1-16. Big Bend Unit 4 discharge-water quality following treatment to meet State and Federal effluent limitations[a]

Parameter	Boiler blowdown[b]	FGD blowdown	Bottom-ash blowdown	Intake circulating water (maximum)[c]	Detectable effluent water quality at combined discharge	Florida water-quality standard
Arsenic	0.193	0.250	0.02	0.232	0.232	0.05
Cadmium	<0.005	0.01	<0.005	<0.055	0.055	0.005
Chromium	0.065	0.03	0.01	0.075	0.075	0.05
Copper	1	0.06	0.003	0.098	0.098	0.015
Iron	1	0.05	0.71	1.014	1.014	0.3
Lead	<0.1	0.05	0.005	0.1	0.1	0.05
Mercury	0.007	<0.0002	<0.0002	0.0540	0.0540	0.0001
Nickel	0.096	0.03	0.02	0.180	0.180	0.1
Selenium	0.032	0.009	<0.004	0.112	0.112	0.025
Zinc	0.05	0.24	0.05	0.302	0.302	1.0

[a] All data in milligrams per liter.

[b] No treatment required to meet effluent standards.

[c] From 1981 data.

Table 1-17. Big Bend Unit 4 discharge-water quality following treatment to meet State and Federal effluent limitations and reverse-osmosis treatment of the blowdown streams[a]

Parameter	Combined blowdown streams after heavy-metal treatment	Intake circulating water (maximum)[b]	Combined detectable water quality at discharge (heavy-metal removal)	Combined detectable water quality at discharge (no heavy-metal removal)	Florida water-quality standard
Arsenic	0.05	0.232	0.232	0.232	0.05
Cadmium	0.005	0.055	0.055	0.055	0.005
Chromium	0.045	0.075	0.075	0.075	0.05
Copper	0.015	0.098	0.098	0.098	0.015
Iron	0.3	1.014	1.014	1.014	0.3
Lead	0.038	0.1	0.1	0.1	0.05
Mercury	0.0001	0.054	0.054	0.054	0.0001
Nickel	0.037	0.180	0.180	0.180	0.1
Selenium	0.011	0.112	0.112	0.112	0.025
Zinc	0.012	0.302	0.302	0.302	1.0

[a] All data in milligrams per liter.
[b] From 1981 data.

Table 1-18. Checklist of special status species (Sheet 1 of 2)

Species	Expected at site	Local activity	Federal status[a]	State status[a,b]	Local habitat	Primary impacts[c]
Shellfish						
Mangrove crab	Yes	Resident		T	Mangroves	No long-term
Atlantic geoduck	Unknown	--		R	Subtidal	Siltation
Fish						
Atlantic sturgeon	Possible	Resident		T	Anadromous Mangroves; salt marsh	Water pollution
Rivulus	Possible	Resident		T	Estuarine	Unknown
Opossum pipefish	Possible	Resident		R	Brackish/freshwater	Unknown
Mountain mullet	Possible	Resident		R	Catadromous	Unknown
Terrestrial invertebrates						
Stock Island tree snail	No	--	t	T	--	--
Bahama swallowtail butterfly	No	--	t	T	--	--
Schaus swallowtail butterfly	No	--	t	T	--	--
Florida tree snail	No	--	u	--	--	--
Atala butterfly	Unknown	Unknown	u	--	Unknown	Unknown
Gopher tortoise copris beetle	Possible			T		
Peninsular gopher tortoise dung beetle	Possible	(d)		T	(d)	Loss of habitat
Gopher tortoise aphodium beetle	Possible	(d)		T	(d)	Loss of habitat
Southwest Florida wingless burrowing beetle	Possible	--		T	--	Loss of habitat
Abotis purse-web spider	Possible			SC	Mesic woods	No long-term
Scarab beetles (3 species)	Possible	Unknown		U	Unknown	Unknown
Amphibians/reptiles						
Florida crawfish frog	Possible	Resident		SC/T	Prairie; dry pine flatwoods	Loss of habitat
River cooter	No	--		SC/T	--	--
Gopher tortoise	Possible	Resident		SC/T	Prairie; dry pine flatwoods	Loss of habitat
American alligator	Possible	Resident	t	SC	Wetlands	No long-term
Eastern indigo snake	Yes	Resident	t	SC	Myrtle/saltbush, pines	Loss of habitat
Short-tailed snake	No	--		T/E	--	Loss of habitat
Atlantic loggerhead	Possible	Rare visitor	t	T	Estuarine	No long-term
Atlantic green	Possible	Rare visitor	e	E	Estuarine	No long-term
Atlantic leatherback	No	--	e	E/R	--	--
Atlantic ridley	Possible	Rare visitor	e	E	Estuarine	No long-term
Birds						
Wood stork	Yes	Feeding		E	Freshwater wetlands	Collision; no long-term
Peregrine falcon	Possible	Rare visitor	e	E	Mangroves	Collision; no long-term
Cuban snowy plover	No	--		E	--	--
Red-cockaded woodpecker	No	--	e	T/E	--	--
Eastern brown pelican	Yes	Feeding	e	T	Mangroves	Collision; no long-term
Southern bald eagle	Possible	Feeding	e	T	Near water	Collision; electrocution
Southeast American kestrel	No	--		T	--	--
Audubon's caracara	Possible	Visitor		T	Grasslands	Loss of habitat
Florida sandhill crane	No	--		T	--	--
American oystercatcher	Yes	Possible resident		SC/T	Beaches; mudflats	No long-term
Least tern	Yes	Possible resident		T	Beaches	No long-term
Florida scrub jay	No	--		T	--	--
Reddish egret	Yes	Feeding		SC/R	Saltwater wetlands	No long-term
Roseate spoonbill	Yes	Feeding		SC/R	Mangroves	No long-term
Little blue heron	Yes	Feeding		SC	Wetlands	No long-term
Snowy egret	Yes	Feeding		SC	Wetlands	No long-term
Rothschild's magnificant frigatebird	Possible	Visitor		T	Mangroves	Collision
Osprey	Yes	Feeding		T	Aquatic	Collision; electrocution
White-tailed kite	No	--		R	Grasslands; marshes	Collision; electrocution
Short-tailed hawk	Possible	Visitor		R	Coastal swamps	Collision; electrocution
Mangrove cuckoo	Possible	Resident		R	Mangroves	No long-term
Black-whiskered vireo	Possible	Resident		R	Mangroves	No long-term
Florida great white heron	Possible	Feeding		SC	Coastal	No long-term
Great egret	Yes	Resident		SC	Coastal; wetlands	No long-term
Black-crowned night heron	Possible	Resident		SC	Swamps; tidal marshes	No long-term
Yellow-crowned night heron	Yes	Resident		SC	Swamps; tidal marshes	No long-term

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Note: See footnotes at end of table.

Table 1-18. Checklist of special status species (Sheet 2 of 2)

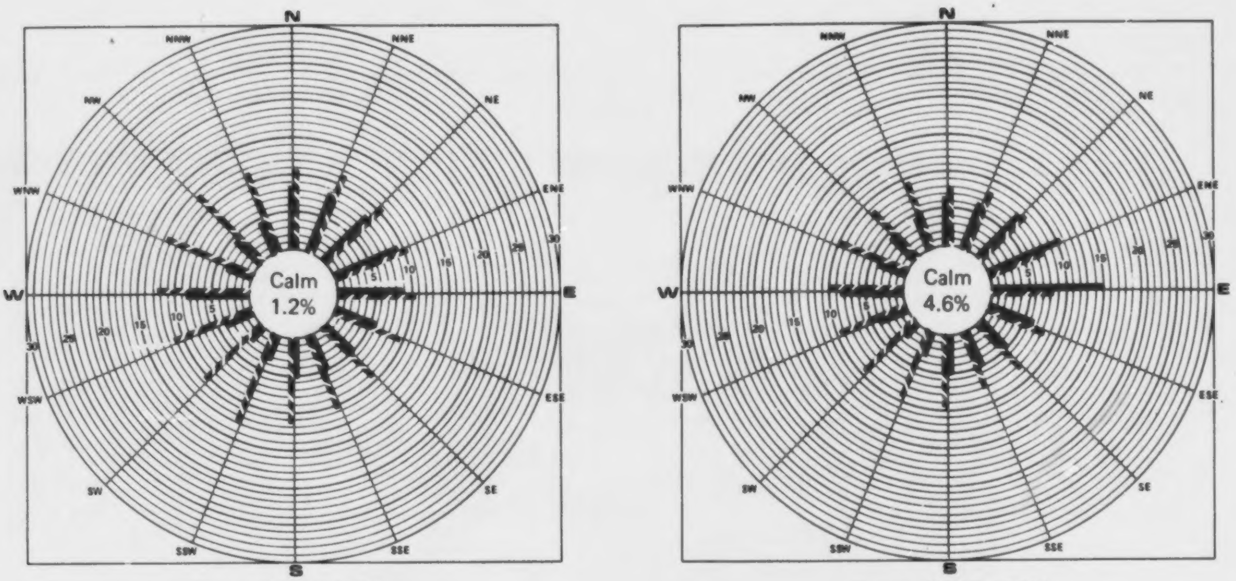
Species	Expected at site	Local activity	Federal status[a]	State status[a,b]	Local habitat	Primary impacts[c]
Birds (continued)						
Eastern least bittern	Yes	Resident		SC	Mangroves	No long-term
Glossy ibis	Yes	Resident		SC	Mangroves; marshes	No long-term
White ibis	Yes	Resident		SC	Coastal	No long-term
Cooper's hawk	Possible	Feeding		SC	Woodlands	No long-term
Piping plover	Possible	Feeding		SC	Beaches	No long-term
American avocet	Possible	Migrant		SC	Wetlands	No long-term
Royal tern	Yes	Resident		SC	Saltwater beaches	No long-term
Sandwich tern	Possible	Feeding		SC	Beaches	No long-term
Caspian tern	Yes	Resident		SC	Beaches	No long-term
Black skimmer	Yes	Resident		SC	Mangroves; beaches	No long-term
Southern hairy woodpecker	Possible	Resident		SC	Woodlands	No long-term
Prairie warbler	Yes	Resident		SC	Various	No long-term
Louisiana heron	Yes	Feeding		SC	Wetlands	No long-term
Limpkin	Possible	Possible resident		SC	Freshwater wetlands	No long-term
Florida burrowing owl	Possible	Visitor		SC	Prairies; pasture	Loss of habitat
Marians marsh wren	No	—		SC	—	Loss of habitat
Mammals						
Sherman's fox squirrel	No	—		SC/T	—	—
Florida mouse	No	—		T	—	—
Black bear	No	—		R	—	—
Florida panther	No	—	e	E	—	—
Manatee	Yes	Wintering; feeding	e	E/T	Saltwater, wetlands	Use of warmed discharge water; mortality from powercraft, poaching; habitat loss
River otter	No	—	u		—	—
Bobcat	No	—	u		—	—
Big brown bat	No	—		R	—	—
Rafinesque's bat	No			R	—	—
Florida weasel	Possible	Resident		R	Variety	Loss of habitat
Round-tailed muskrat	Possible	Resident		SC	Freshwater wetlands	No long-term

[a] Key:
E = endangered.
T = threatened.
SC = special status.
R = rare.
U = under review.
e = endangered (45 FR 99, 33768-33781).
t = threatened (45 FR 99, 33768-33781).
u = under review (45 FR 99, 33768-33781).

[b] Species status based on designation by either the Florida Game and Fresh Water Fish Commission (1979) or the Florida Committee on Rare and Endangered Plants and Animals (Tables 1-61 through 2-65; 1976).

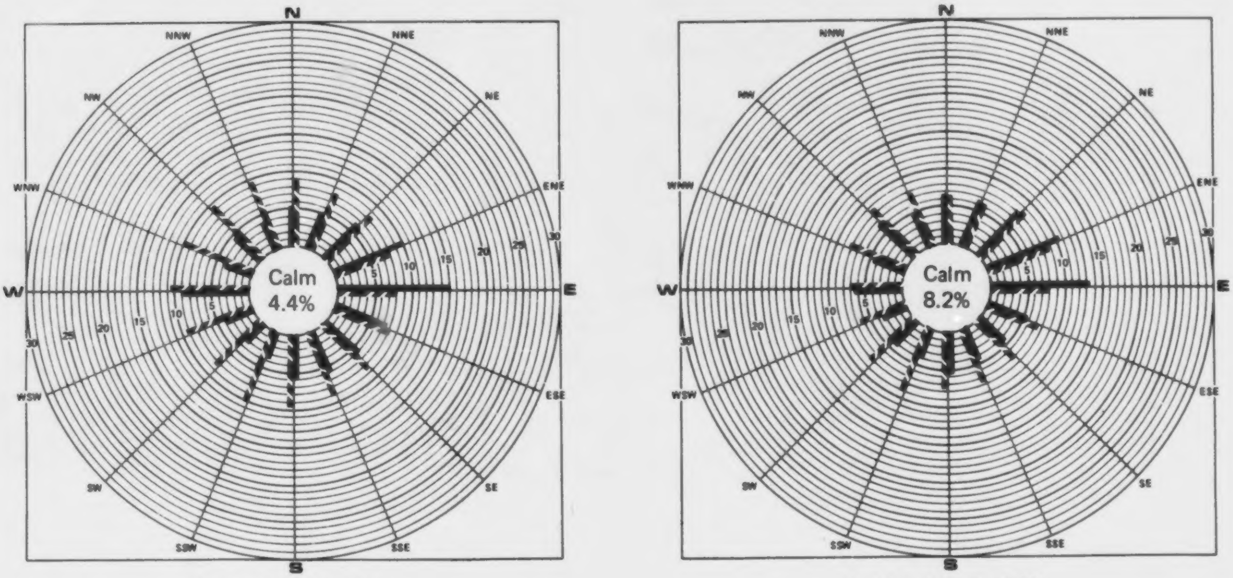
[c] Possible secondary impacts are a decrease in environmental quality and reduction of habitat.

[d] Associated with the gopher tortoise.



Tampa (1960-1964)

Tampa (1965-1969)

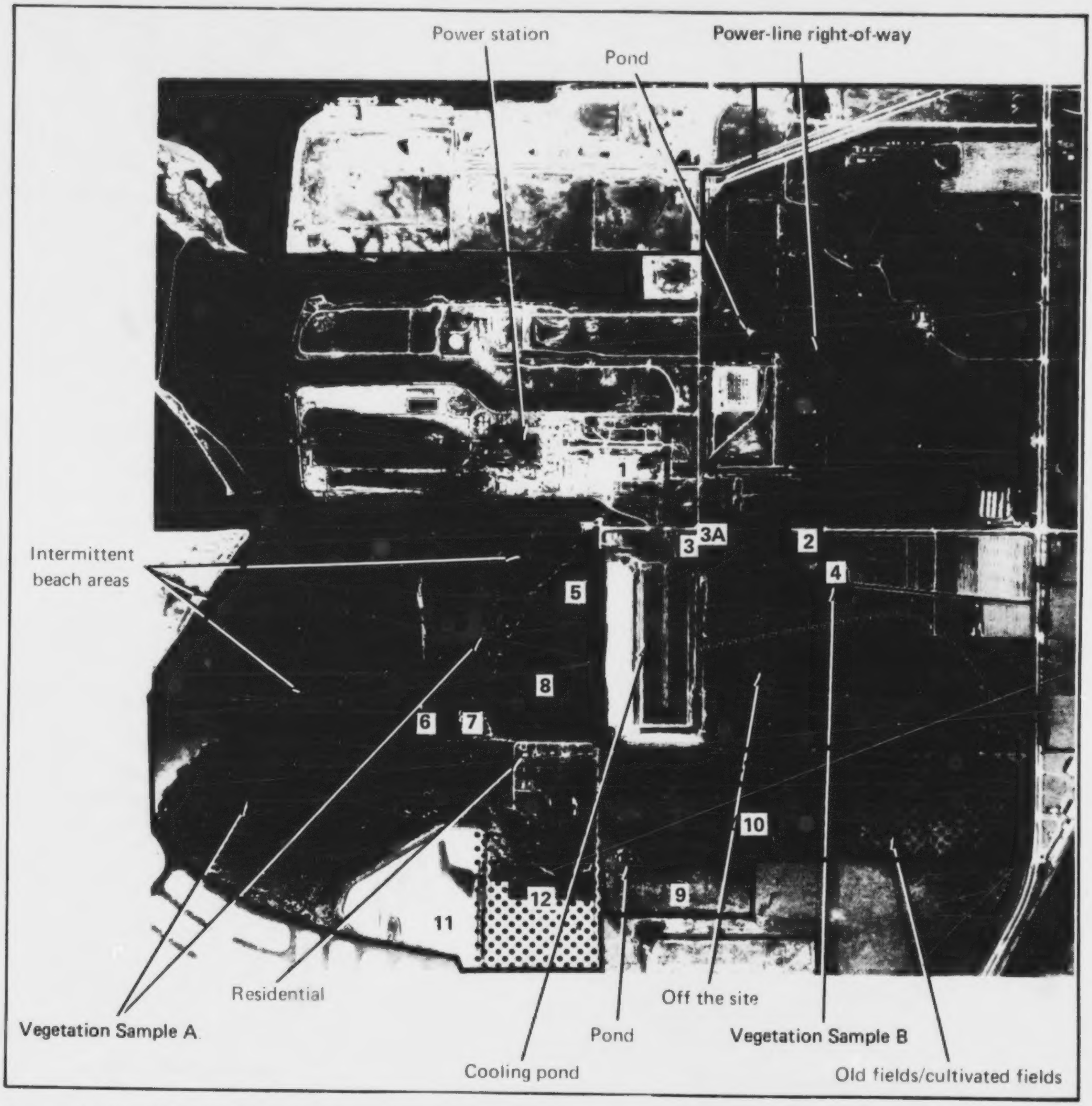


Tampa (1971-1975)

MacDill (1965-1969)

Wind direction frequency (%)
Mean wind speed (mph)

Figure 1-7. Annual wind roses for Tampa and MacDill.


Power station
Power-line right-of-way
Pond
1
Intermittent beach areas
3
3A
2
4
5
8
6
7
10
9
12
11
Residential
Vegetation Sample A
Cooling pond
Pond
Off the site
Vegetation Sample B
Old fields/cultivated fields

Power station boundaries of Tampa Electric Company, 1973.
"Big Bend Lands" engineering line drawing dated November 8, 1973.

1	Ruderal community
2	Power-line right-of-way
3	Successionally advanced ruderal community
3A	Successionally advanced ruderal community
4	Freshwater wetlands
5	Pine flatwoods
6	Mangrove community
7	Mangrove-pine flatwoods transition area
8	Pine flatwoods
9	Pasture
10	Pasture pond
11	Artificial barren land
12	Ruderal community

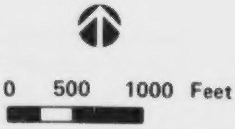

0 500 1000 Feet

Figure 1-8. Vegetation cover types of Big Bend Station.

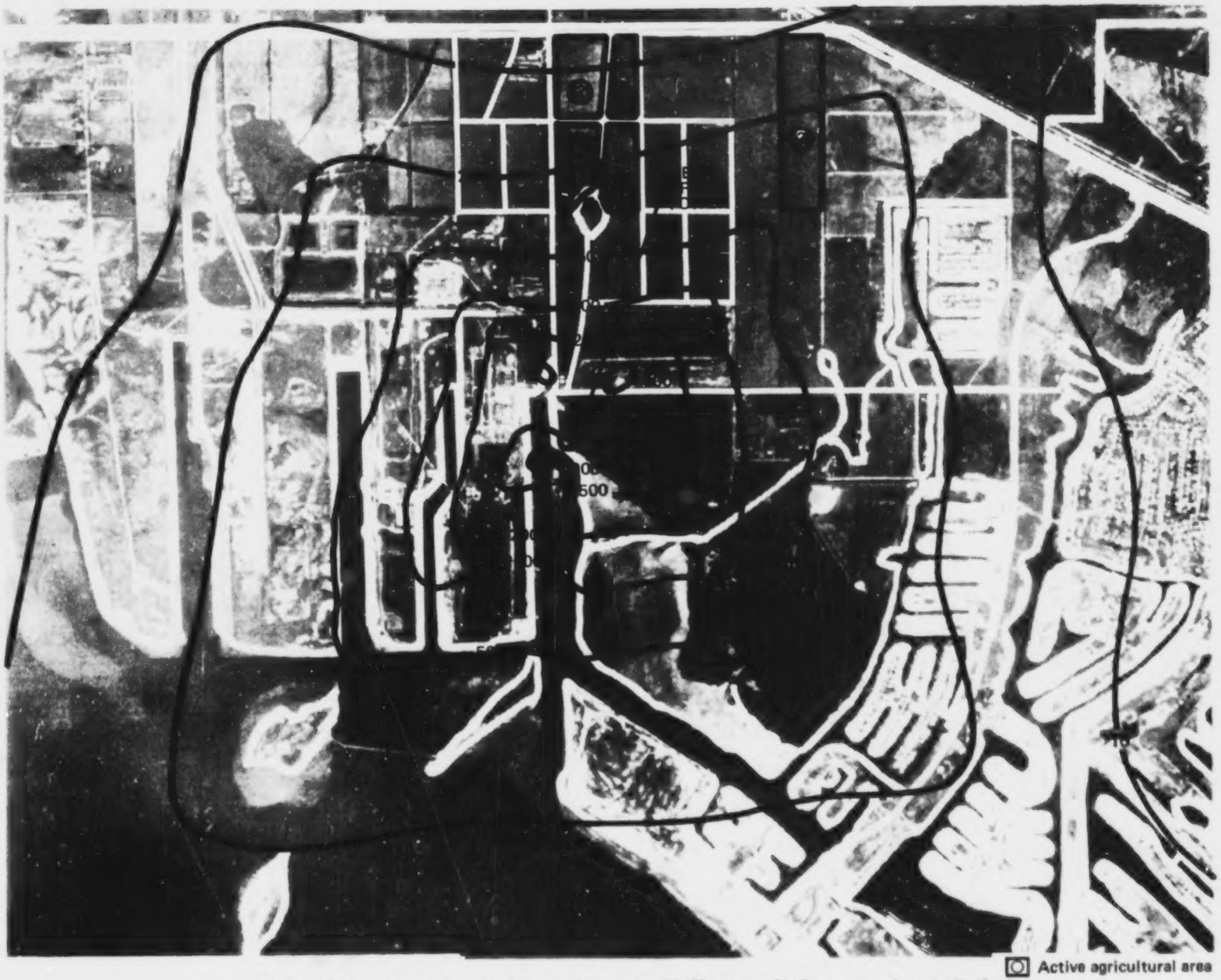

500
Active agricultural area

Figure 1-9. Annual salt-deposition rate (lb/(acre·yr)) for a mechanical-draft cooling tower at Big Bend Station.

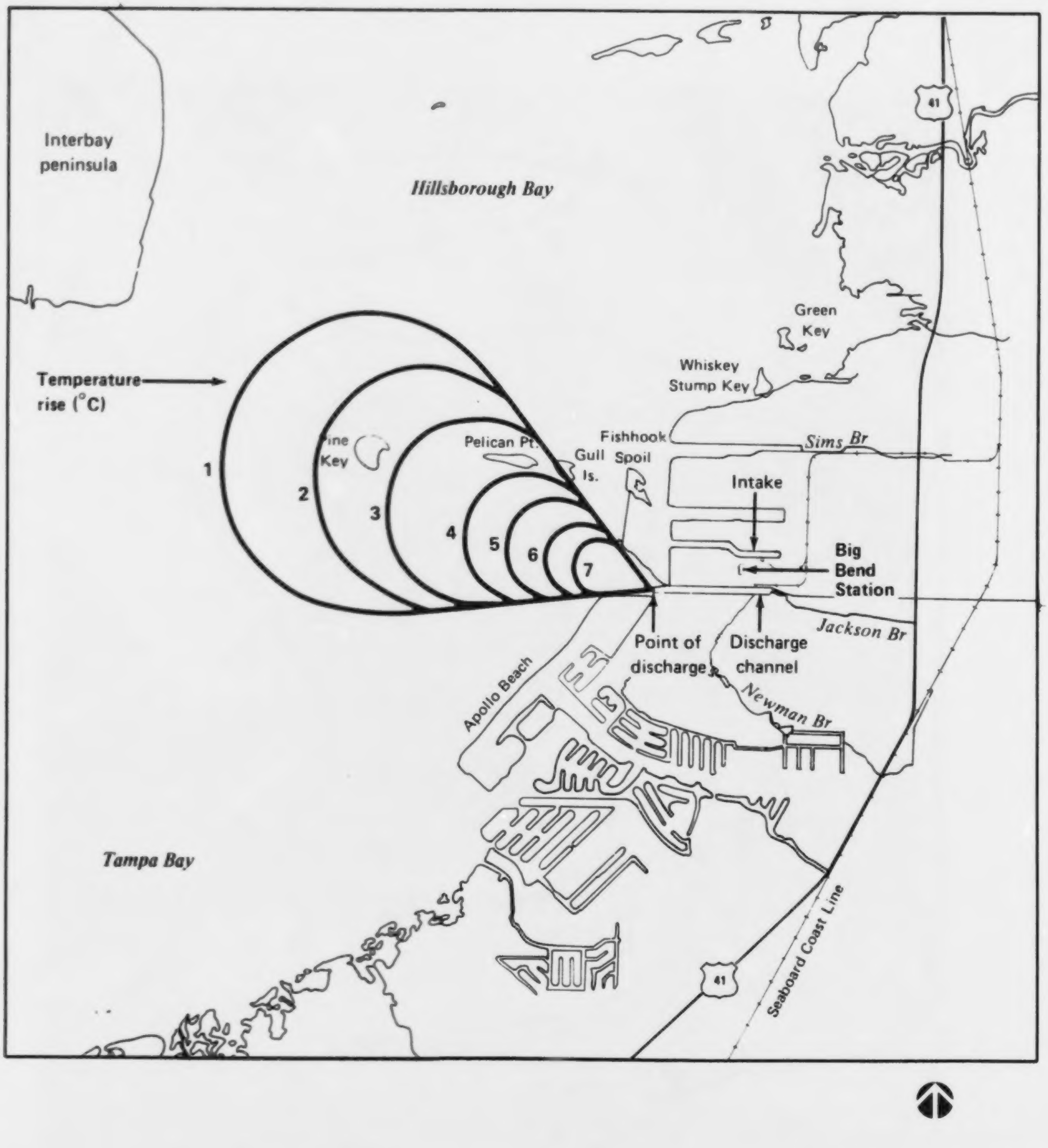
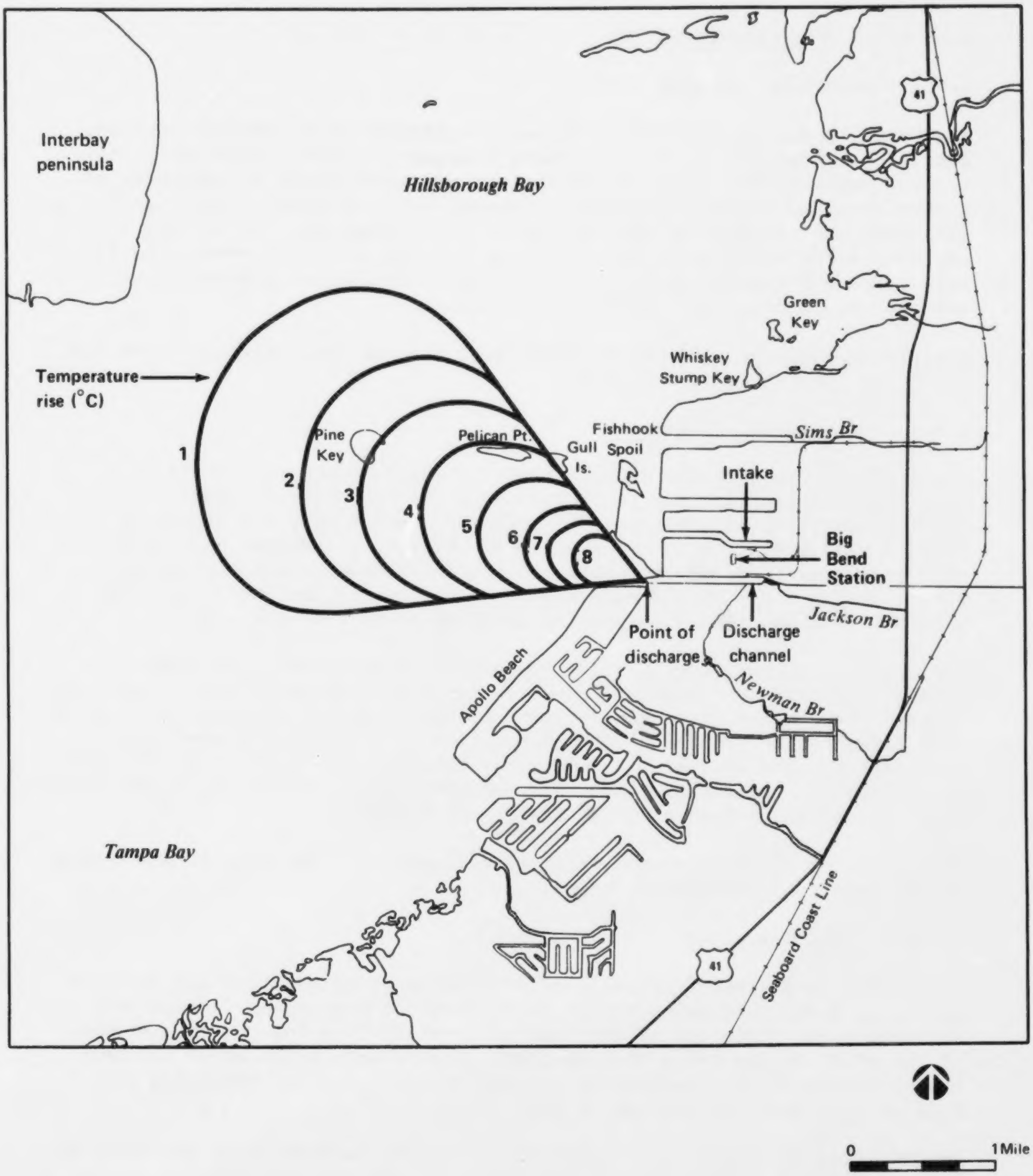

Interbay peninsula
Hillsborough Bay
Temperature rise (°C)
1
2
3
4
5
6
7
Pine Key
Pelican Pt.
Gull Is.
Fishhook Spoil
Green Key
Whiskey Stump Key
Sims Br
Intake
Big Bend Station
Point of discharge
Discharge channel
Jackson Br
Newman Br
Apollo Beach
Tampa Bay
41
41
Seaboard Coast Line
0
1 Mile

Figure 1-10. Isothermal contour map for three generating units operating at 100 percent load with no dilution pumps, Big Bend Station.



Interbay peninsula
Hillsborough Bay
Temperature rise (°C)
1
2
3
4
5
6
7
8
Pine Key
Pelican Pt.
Gull Is.
Fishhook Spoil
Green Key
Whiskey Stump Key
Sims Br
Intake
Big Bend Station
Point of discharge
Discharge channel
Jackson Br
Newman Br
Apollo Beach
Tampa Bay
41
Seaboard Coast Line
0
1 Mile

Figure 1-11. Isothermal contour map for four Big Bend units operating at 100 percent load with no dilution pumps.

1.4 OTHER NEPA CONSIDERATIONS

1.4.1 UNAVOIDABLE ADVERSE IMPACTS

The proposed action will result in certain adverse environmental impacts, despite the emphasis on state-of-the-art impact control technology in all project particulars. Some of the impacts are unavoidable consequences of a commitment to project objectives; others, while avoidable, are regarded as insignificant compared to the cost of their elimination. In the Big Bend 4 project, every effort will be made to ensure the most environmentally favorable tradeoffs between construction and operation of the generating unit and the use of air, land, and water resources.

Descriptions of the unavoidable impacts of the new generating unit are presented in the following sections.

1.4.1.1 Atmospheric Resources

There will be an increase in pollutants released to the atmosphere as a result of the proposed station. The emissions of sulfur dioxide, nitrogen dioxide, and particulates from the proposed station will not result in any violation of Federal or State ambient air quality standards. Air emissions will use up portions of available prevention of significant air quality deterioration Class II increments at points close to the facility. This will not preclude future industrial development in the site region.

Emissions of sulfur dioxide and nitrogen oxides have been associated with acid precipitation. To date, however, only a general relationship has been established; the relationship between emissions of the precursor pollutants from a particular source and acid deposition in a particular area remains speculative. The most highly publicized relationship is that between emissions from the industrial Midwestern and the Eastern United States and "acid rain" in the Northeastern United States and Canada.

The operation of the proposed facility will not have any significant impact on the levels of atmospheric ozone.

1.4.1.2 Land Resources

There will be a loss of approximately 66 acres of pastureland and 31 acres of agricultural land owing to the development of the gypsum storage and disposal area. This use of the land will result in a loss or displacement of the wildlife now using this habitat. Approximately 121 acres of additional land will be preempted by the ash disposal system, resulting in a loss of this wildlife habitat as well.

Neither loss is considered significantly adverse because these habitats have been recently disturbed and are not unique to the Big Bend site or to the surrounding areas. Moreover, they are among the least biologically important wildlife habitats at the site.

1.4.1.3 Water

Construction of the Unit 4 discharge structure will require the removal of approximately 690 cubic yards of sand and silt from the bottom of the discharge canal. This will result in the direct loss of many benthic invertebrate organisms.

Prototype studies at the site have confirmed that the fine-mesh screening of intake structures is a feasible technology that will minimize entrainment effects. They have also shown that the installation of fine-mesh screens on the intake structures of Big Bend Units 3 and 4 will result in entrainment effects approximately equal to the current impacts associated with the operation of Units 1, 2, and 3 using conventional intake technology. These impacts are not expected to be significant.

1.4.1.4 Sensitive Areas

The indigo snake is the only rare, endangered, or threatened species on which the construction and operation of Unit 4 could have a direct adverse impact. This species was reported on the site in 1974 and could occur in habitat types that will be disturbed by the Big Bend 4 project. It cannot be determined from available information, however, whether the species presently inhabits the site and thus whether in fact it will be adversely affected.

A small 1-acre pond and marsh area will be destroyed by the construction of the gypsum storage and disposal area. This loss is not deemed significant, however, because of the small size of the area and the presence of other larger wetland areas in the region.

The existing drainage patterns on the site will be modified to accommodate disposal areas for gypsum and ash. The most significant of these modifications will be the relocation of Jackson Branch.

1.4.2 RELATIONSHIP OF SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

During the proposed 30-year life of Unit 4, the air, water, and land resources of the site will be committed to the production of electric power. There will be no commitment of new resources beyond the site, since the existing transmission right-of-way will be used for new power lines and all solid wastes will be disposed of at the site or sold for commercial use.

The production of electricity during the operating life of the station will contribute to tourism and other industries within the TECO service area and within those of other utilities purchasing power from Unit 4. This electric power will accommodate the projected increase in the population of the region and will contribute to the health and safety of the general populace.

1.4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed plant will consume an estimated 28.5 million tons of coal during its 30-year life. The consumption of fuel oil for startup and flame stabilization is expected to be 10,143 barrels over the life of the station.

The FGD system will use an estimated 3.4 million tons of limestone during plant life. Most of this resource will be irretrievably committed; some, however, will be recovered as gypsum, which could be sold for wallboard manufacture.

Materials like concrete cannot be recycled and thus will be irretrievably committed to the construction of the station. Other materials, such as steel and aluminum, may be reclaimed if it is economically feasible.

Approximately 218 acres of agricultural and grazing land will be irretrievably committed to the storage of gypsum (97 acres) as well as bottom and fly ash (121 acres). A small 1-acre marsh will be likewise committed.

1.4.4 CONFLICTS BETWEEN THE PROPOSED ACTION AND THE OBJECTIVES OF FEDERAL, REGIONAL, STATE, AND LOCAL PLANS

There are no known conflicts between the proposed action and any Federal, regional, State, or local plans for the Big Bend area.

Chapter 2
ERRATA

The following corrections and/or additions should be made to the Draft Environmental Impact Statement.

Page	Paragraph	Line(s)	Correction
1-1	5	4	Approximate number of customers should be 316,000.
1-2	7	6	Insert "(See Figure 1-2)" after "(System Planning Committee, 1979)."
1-3	6	7 & 8	Delete sentence beginning: "Therefore, any further...." and replace with the following, "Furthermore, delay in constructing Big Bend Unit 4 would potentially jeopardize future service to customers (Appendix G)."
1-3	7	1	The sentence should begin: "Alternatives to the need for this project..."
2-3	2	5 & 6	The sentence should read: "Further, all efforts to obtain capacity from other utilities have been determined not to be cost- or time-effective on the basis of the economics considered."
2-23	Figure 2-4		See Figure 2-4R. The location of NPDES Serial No. 001 has been corrected.
2-24	Figure 2-5		See Figure 2-5R, corrected water balance diagram.
2-26	1	1	The sentence should begin, "As a result of EPA concerns..."
2-48	Table 2-5		For alternatives 8 and 9, entrainment impacts should read "None."

Page	Paragraph	Line(s)	Correction
2-61	1	all	See page 1-22 of FEIS (Section 1.2.7) for correct language
3-4	4	8	"900 tons per year" should read: "1200 tons per year"
3-19	Table 3-11	footnote f	"46,920,000 Btu/hr" should read: "4,692 MMBtu/hr"
3-25	Table 3-18		Second line of title should read, "summary of ORFAD modeling results[a]."
3-61	3	4	"(Table 3-33)" should read "(Table 3-38)."
3-63	4	2	"Table 3-39" should read "Table 3-40."
3-63	4	3	"Table 3-40" should read "Table 3-41."
3-91	Table 3-26		Value for zinc in column 5 should be 0.05.
3-163	2	8	Table 3-53 was omitted from DEIS. A copy is included herein.
3-164	5	2	"Table 3-15" should read "Table 3-7."
3-164	6	5/6	"Figure 3-29" should read "Figure 3-21."
F-11	all	all	Replace existing page F-11 with corrected page F-11R

1-94

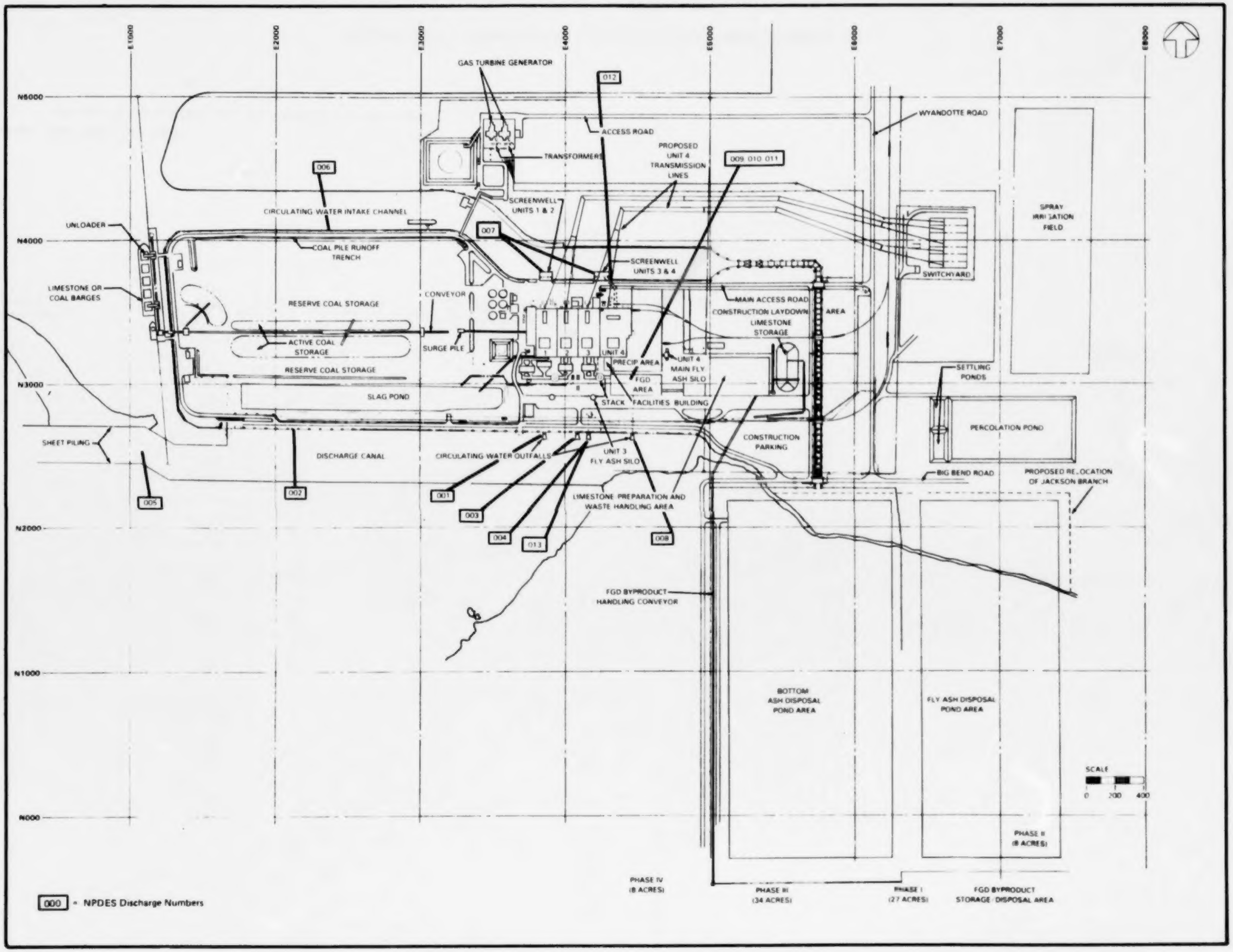
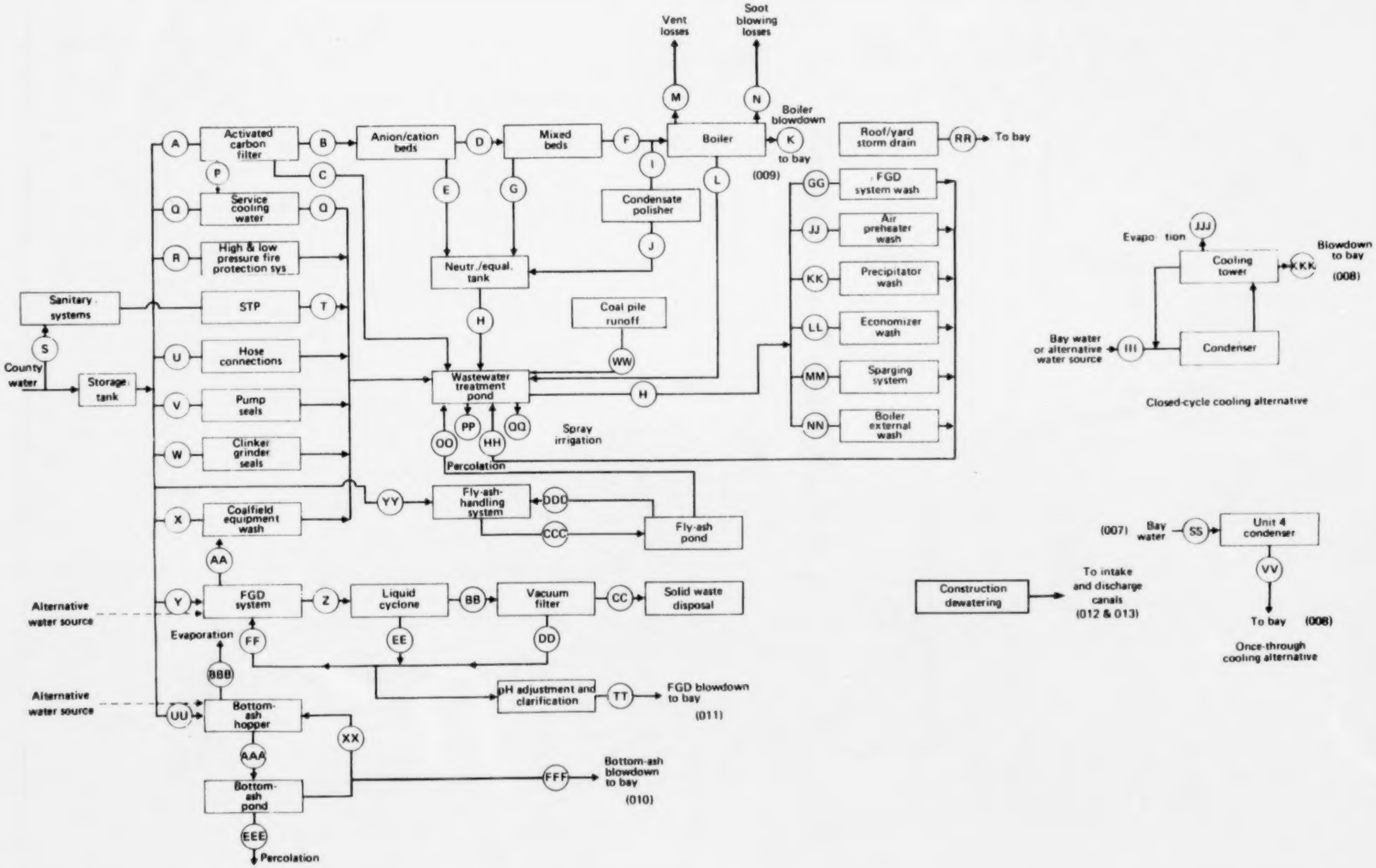

E1000
E2000
E3000
E4000
E5000
E6000
E7000
E8000
N5000
N4000
N3000
N2000
N1000
N000
GAS TURBINE GENERATOR
012
ACCESS ROAD
TRANSFORMERS
PROPOSED UNIT 4 TRANSMISSION LINES
009 010 011
WYANDOTTE ROAD
SPRAY IRRIGATION FIELD
006
CIRCULATING WATER INTAKE CHANNEL
SCREENWELL UNITS 1 & 2
UNLOADER
007
COAL PILE RUNOFF TRENCH
SCREENWELL UNITS 3 & 4
SWITCHYARD
LIMESTONE OR COAL BARGES
RESERVE COAL STORAGE
CONVEYOR
MAIN ACCESS ROAD
CONSTRUCTION LAYDOWN AREA
LIMESTONE STORAGE
ACTIVE COAL STORAGE
SURGE PILE
UNIT 4
PRECIP AREA
UNIT 4 MAIN FLY ASH SILO
RESERVE COAL STORAGE
FGD AREA
SETTLING PONDS
SLAG POND
STACK
FACILITIES BUILDING
PERCOLATION POND
SHEET PILING
DISCHARGE CANAL
CIRCULATING WATER OUTFALLS
UNIT 3 FLY ASH SILO
CONSTRUCTION PARKING
BIG BEND ROAD
PROPOSED RELOCATION OF JACKSON BRANCH
005
002
001
003
004
013
LIMESTONE PREPARATION AND WASTE HANDLING AREA
008
FGD BYPRODUCT HANDLING CONVEYOR
BOTTOM ASH DISPOSAL POND AREA
FLY ASH DISPOSAL POND AREA
SCALE
0
200
400
PHASE II (8 ACRES)
PHASE IV (8 ACRES)
PHASE III (34 ACRES)
PHASE I (27 ACRES)
FGD BYPRODUCT STORAGE/DISPOSAL AREA
000 = NPDES Discharge Numbers

Figure 2-4R. Plot plan, Big Bend Station.

1-95


Vent losses
Soot blowing losses
Boiler blowdown
to bay
(009)
County water
Sanitary systems
Storage tank
Activated carbon filter
Service cooling water
High & low pressure fire protection sys
STP
Hose connections
Pump seals
Clinker grinder seals
Coalfield equipment wash
FGD system
Bottom-ash hopper
Bottom-ash pond
Percolation
Alternative water source
Alternative water source
Evaporation
Anion/cation beds
Mixed beds
Boiler
Condensate polisher
Neutr./equal. tank
Coal pile runoff
Wastewater treatment pond
Spray irrigation
Percolation
Fly-ash-handling system
Fly-ash pond
Liquid cyclone
Vacuum filter
Solid waste disposal
pH adjustment and clarification
FGD blowdown to bay
(011)
Bottom-ash blowdown to bay
(010)
Roof/yard storm drain
To bay
FGD system wash
Air preheater wash
Precipitator wash
Economizer wash
Sparging system
Boiler external wash
A
B
C
D
E
F
G
H
I
J
K
L
M
N
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF
GG
HH
JJ
KK
LL
MM
NN
OO
PP
QQ
RR
SS
TT
UU
VV
WW
XX
YY
AAA
BBB
CCC
DDD
EEE
FFF
III
JJJ
KKK
Evapo tion
Cooling tower
Condenser
Blowdown to bay
(008)
Bay water or alternative water source
Closed-cycle cooling alternative
(007)
Bay water
Unit 4 condenser
To bay
(008)
Once-through cooling alternative
Construction dewatering
To intake and discharge canals
(012 & 013)

Notes: See Table 2-4 for key.
Numbers in parentheses refer to NPDES Serial Numbers.

Figure 2-5R. Plant water balance for Big Bend Station.

1-96

Table 3-53. Checklist of special status species (Sheet 1 of 2)

Species	Expected at site	Local activity	Federal status[a]	State status[a,b]	Local habitat	Primary impacts[c]
Shellfish						
Mangrove crab	Yes	Resident		T	Mangroves	No long-term
Atlantic geoduck	Unknown	--		R	Subtidal	Siltation
Fish						
Atlantic sturgeon	Possible	Resident		T	Anadromous Mangroves; salt marsh	Water pollution
Rivulus	Possible	Resident		T	Estuarine	Unknown
Opossum pipefish	Possible	Resident		R	Brackish/freshwater	Unknown
Mountain mullet	Possible	Resident		R	Catadromous	Unknown
Terrestrial invertebrates						
Stock Island tree snail	No	--	t	T	--	--
Bahama swallowtail butterfly	No	--	t	T	--	--
Schaus swallowtail butterfly	No	--	t	T	--	--
Florida tree snail	No	--	u	--	--	--
Atala butterfly	Unknown	Unknown	u	--	Unknown	Unknown
Gopher tortoise copris beetle	Possible			T		
Peninsular gopher tortoise dung beetle	Possible	(d)		T	(d)	Loss of habitat
Gopher tortoise aphodium beetle	Possible	(d)		T	(d)	Loss of habitat
Southwest Florida wingless burrowing beetle	Possible	--		T	--	Loss of habitat
Abotis purse-web spider	Possible			SC	Mesic woods	No long-term
Scarab beetles (3 species)	Possible	Unknown		U	Unknown	Unknown
Amphibians/reptiles						
Florida crawfish frog	Possible	Resident		SC/T	Prairie; dry pine flatwoods	Loss of habitat
River cooter	No	--		SC/T	--	--
Gopher tortoise	Possible	Resident		SC/T	Prairie; dry pine flatwoods	Loss of habitat
American alligator	Possible	Resident	t	SC	Wetlands	No long-term
Eastern indigo snake	Yes	Resident	t	SC	Myrtle/saltbush, pines	Loss of habitat
Short-tailed snake	No	--		T/E	--	Loss of habitat
Atlantic loggerhead	Possible	Rare visitor	t	T	Estuarine	No long-term
Atlantic green	Possible	Rare visitor	e	E	Estuarine	No long-term
Atlantic leatherback	No	--	e	E/R	--	--
Atlantic ridley	Possible	Rare visitor	e	E	Estuarine	No long-term
Birds						
Wood stork	Yes	Feeding		E	Freshwater wetlands	Collision; no long-term
Peregrine falcon	Possible	Rare visitor	e	E	Mangroves	Collision; no long-term
Cuban snowy plover	No	--		E	--	--
Red-cockaded woodpecker	No	--	e	T/E	--	--
Eastern brown pelican	Yes	Feeding	e	T	Mangroves	Collision; no long-term
Southern bald eagle	Possible	Feeding	e	T	Near water	Collision; electrocution
Southeast American kestrel	No	--		T	--	--
Audubon's caracara	Possible	Visitor		T	Grasslands	Loss of habitat
Florida sandhill crane	No	--		T	--	--
American oystercatcher	Yes	Possible resident		SC/T	Beaches; mudflats	No long-term
Least tern	Yes	Possible resident		T	Beaches	No long-term
Florida scrub jay	No	--		T	--	--
Reddish egret	Yes	Feeding		SC/R	Saltwater wetlands	No long-term
Roseate spoonbill	Yes	Feeding		SC/R	Mangroves	No long-term
Little blue heron	Yes	Feeding		SC	Wetlands	No long-term
Snowy egret	Yes	Feeding		SC	Wetlands	No long-term
Rothschild's magnificant frigatebird	Possible	Visitor		T	Mangroves	Collision
Osprey	Yes	Feeding		T	Aquatic	Collision; electrocution
White-tailed kite	No	--		R	Grasslands; marshes	Collision; electrocution
Short-tailed hawk	Possible	Visitor		R	Coastal swamps	Collision; electrocution
Mangrove cuckoo	Possible	Resident		R	Mangroves	No long-term
Black-whiskered vireo	Possible	Resident		R	Mangroves	No long-term
Florida great white heron	Possible	Feeding		SC	Coastal	No long-term
Great egret	Yes	Resident		SC	Coastal; wetlands	No long-term
Black-crowned night heron	Possible	Resident		SC	Swamps; tidal marshes	No long-term
Yellow-crowned night heron	Yes	Resident		SC	Swamps; tidal marshes	No long-term

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Note: See footnotes at end of table.

1-97

Table 3-53. Checklist of special status species (Sheet 2 of 2)

Species	Expected at site	Local activity	Federal status[a]	State status[a,b]	Local habitat	Primary impacts[c]
Birds (continued)						
Eastern least bittern	Yes	Resident		SC	Mangroves	No long-term
Glossy ibis	Yes	Resident		SC	Mangroves; marshes	No long-term
White ibis	Yes	Resident		SC	Coastal	No long-term
Cooper's hawk	Possible	Feeding		SC	Woodlands	No long-term
Piping plover	Possible	Feeding		SC	Beaches	No long-term
American avocet	Possible	Migrant		SC	Wetlands	No long-term
Royal tern	Yes	Resident		SC	Saltwater beaches	No long-term
Sandwich tern	Possible	Feeding		SC	Beaches	No long-term
Caspian tern	Yes	Resident		SC	Beaches	No long-term
Black skimmer	Yes	Resident		SC	Mangroves; beaches	No long-term
Southern hairy woodpecker	Possible	Resident		SC	Woodlands	No long-term
Prairie warbler	Yes	Resident		SC	Various	No long-term
Louisiana heron	Yes	Feeding		SC	Wetlands	No long-term
Limpkin	Possible	Possible resident		SC	Freshwater wetlands	No long-term
Florida burrowing owl	Possible	Visitor		SC	Prairies; pasture	Loss of habitat
Marians marsh wren	No	—		SC	—	Loss of habitat
Mammals						
Sherman's fox squirrel	No	—		SC/T	—	—
Florida mouse	No	—		T	—	—
Black bear	No	—		R	—	—
Florida panther	No	—	e	E	—	—
Manatee	Yes	Wintering; feeding	e	E/T	Saltwater, wetlands	Use of warmed discharge water; mortality from powercraft, poaching; habitat loss
River otter	No	—	u		—	—
Bobcat	No	—	u		—	—
Big brown bat	No	—		R	—	—
Rafinesque's bat	No			R	—	—
Florida weasel	Possible	Resident		R	Variety	Loss of habitat
Round-tailed muskrat	Possible	Resident		SC	Freshwater wetlands	No long-term

[a] Key:
E = endangered.
T = threatened.
SC = special status.
R = rare.
U = under review.
e = endangered (45 FR 99, 33768-33781).
t = threatened (45 FR 99, 33768-33781).
u = under review (45 FR 99, 33768-33781).

[b] Species status based on designation by either the Florida Game and Fresh Water Fish Commission (1979) or the Florida Committee on Rare and Endangered Plants and Animals (Tables 1-61 through 2-65; 1976).

[c] Possible secondary impacts are a decrease in environmental quality and reduction of habitat.

[d] Associated with the gopher tortoise.

1-98

Parameter	Location	Sample Type	Frequency
Flow, Cooling	Intake	Pump Log	Continuous
Flow, Bottom Ash	Prior to CWS	Recorder	Continuous
Flow, Boiler Blowdown	Prior to CWS	Daily Log	Daily
Flow, FGD Bleed	Prior to CWS	Recorder	Continuous
pH	CWS and prior to CWS on FGD Bleed Boiler & Bottom Ash Blowdown	Grab "	Two per Week
Temperature	CWS Outfall	Recorder	Continuous
TSS	Bottom Ash Blowdown, FGD Bleed, & Boiler Blowdown	Grab	Two per Week Two per Month
Chlorine, Total Residual	Outfall	Multiple Grab	Weekly
Oil and Grease	Boiler Blowdown Bottom Ash Blowdown and FGD bleed	Grab	Two per Month
Metals	Intake, Outfall FGD Bleed Stream Bottom Ash Blowdown & Boiler Blowdown Prior to discharge to CWS	Two-Grab composite, not less than two hours between samples	Two per Month for the first year, then monthly thereafter
Arsenic	"		"
Cadmium	"		"
Iron	"		"
Lead	"		"
Mercury	"		"
Selenium	"		"
Zinc	"		"
Copper	"		"
Chromium	"		"
Nickel	"		"

2. Biological Monitoring

a. Thermal Studies

Sampling shall be done on a bi-monthly basis commencing one month after certification and shall continue for a period of one year after Unit 4 is on-line. Such sampling shall consist of a baseline survey and an intensive survey. Sampling methodology shall be the same as that in the 1979 aquatic biology studies. Deviations from that methodology shall be approved by the DER.

All raw data shall be available upon request by DER. At the end of the first year of post-operational study, the Department shall review all of the data in the form of an annual report and shall determine if

*CWS - Cooling Water System

Revised 6/2/81

Chapter 3
MONITORING PROGRAMS

3.1 GROUNDWATER MONITORING PROGRAM

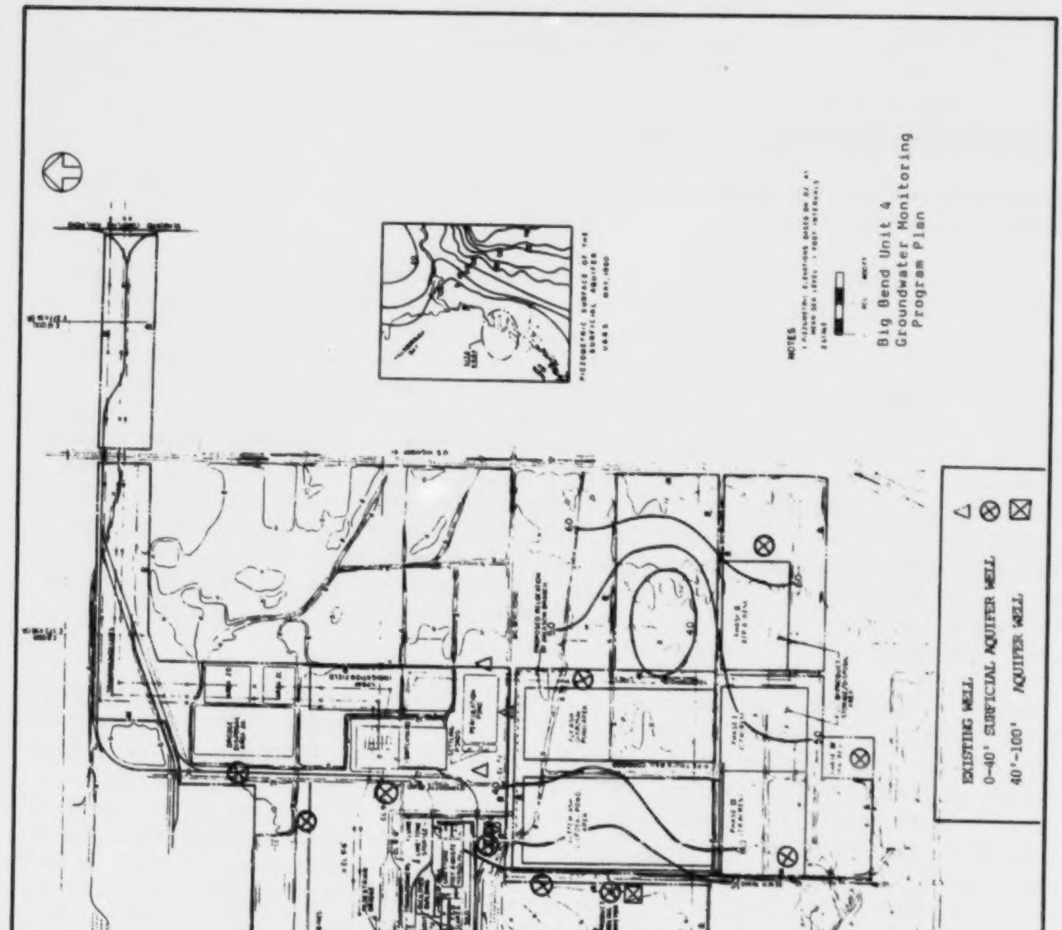
A groundwater monitoring program will be implemented one year prior to the scheduled commercial operation date of Unit 4.

The groundwater monitoring well system is shown generally in attached Figure 3-1. The monitoring well system will consist of eleven new wells and three existing wells. Ten of the new wells will be designed to monitor groundwater quality in the top 40 feet of the surficial aquifer. One well will be installed to a depth greater than 40 feet but less than 100 feet to monitor vertical dispersion of groundwater contaminants. Surficial aquifer wells will be designed, screened and constructed in a manner appropriate for each well location. The exact placement of all the new wells will take into consideration the part of the disposal areas to be used during the first two years of operation. The specific well location and design information (including depth, size, screen design and other features) will be submitted to the U.S. Environmental Protection Agency (EPA), the Florida Department of Environmental Regulation (DER) and the Southwest Florida Water Management District (SWFWMD) for review and approval.

Water quality sampling and analyses will be performed monthly during the year prior to commercial operation and for two years afterwards. Thereafter, analyses will be performed quarterly. When a well is to be sampled, it will first be pumped to obtain a representative sample from the surrounding aquifer. Specific conductance will be monitored as this water is removed from the well. Water will be pumped from the well until the conductivity reading stabilizes or until two casing volumes are removed (whichever is greater). A sample will then be obtained. Each sample will be analyzed according to EPA approved test methods for conductance, pH, chloride, iron, cadmium, zinc, copper, sulfate, silver, nickel, selenium, chromium, arsenic, beryllium, mercury, lead, gross alpha and barium.

Results will be submitted quarterly with the Discharge Monitoring Reports. Should the levels of any parameter show a consistent increase above background levels, EPA and DER will be consulted to determine a course of action acceptable to TECO, EPA, and DER. Based upon the observed trends in the data, an estimate will be made of the point in time when the groundwater quality standards may potentially be exceeded at the boundary of the site. Corrective measure will be initiated within this period of time. Measures to be taken include sealing, relocating or altering operations of the wastewater treatment ponds, spray irrigation field, FGD by-product area, bottom ash area, fly ash area or coal storage pile.

In the event that changes in the monitoring program become necessary or that no significant contamination is occurring due to commercial operation of Unit 4, after consultation with and approval by EPA and DER the program will be modified or eliminated.


NOTES
Big Bend Unit 4
Groundwater Monitoring
Program Plan
EXISTING WELL △
0-40' SURFICIAL AQUIFER WELL ⊗
40'-100' AQUIFER WELL ⊠
TAMPA BAY

Reproduced from best available copy.

Figure 3-1. Piezometric surface map of the surficial aquifer, March 1973, Big Bend Station, Tampa Electric Company.

3.2 CONSTRUCTION EROSION AND SEDIMENTATION CONTROL PROGRAM PLAN

This plan describes the program to be used to control rainfall-related soil erosion and resulting sedimentation in area waters associated with the construction of Big Bend Unit 4.

As the construction area of the unit building borders the intake and discharge channels, measures will be taken to ensure that rainfall runoff from this area does not flow into these channels. These measures include (1) flow direction control through grading and modification of the existing drainage system and (2) placement of straw bales. The existing storm water drainage system in the unit building area is a system of lateral swales, connecting and draining to existing ditches which drain to the channels. This system will be modified by a new drainage system, consisting of trapezoidal swales, catch basins and corrugated metal drainage pipe, which will convey the runoff to the existing concrete flume. The unit building site will be graded to drain into the newly installed storm drainage system as shown in the attached drawing. All drainage originating from the unit building site will be captured by the new storm water system. In addition, straw bales will be placed along the road ditches paralleling the intake and discharge channels and other strategic locations to assure water quality in the adjacent channels is not degraded due to runoff. Whereas all runoff is designed to be contained by the proposed system, the straw bales will provide additional protection for the water quality of the channels.

During construction of the bottom ash, flyash and FGD by-product storage/disposal facilities, rainfall runoff will be controlled by the use of measures such as straw bales, berms, barriers and vegetative planting. During construction, disturbance of the existing ground cover and exposure of unprotected, disturbed areas will be kept to a minimum. In some cases, such as FGD by-product storage areas II, III, and IV, facilities will be developed incrementally; vegetative cover will only be disturbed as the need for these areas are realized and they are subsequently developed. During construction, straw bales will be placed along the relocated Jackson Branch at the northern boundary of the construction area, the east side of the road ditch along the west boundary of the construction area, and other locations downstream of disturbed land areas. These straw bales will remove silt and sediment from the sheet runoff prior to entering Jackson Branch, the discharge channels or any other tributaries.

Reports will be prepared to provide analyses of any problems associated with the control measures and plans to reduce or eliminate such problems. These reports will be submitted quarterly during the first year of construction and semiannually thereafter, and shall be transmitted with the Discharge Monitoring Reports for the Big Bend Station NPDES permit.

3.3 FINE MESH SCREEN ORGANISM RETURN SYSTEM

As described in the Draft EIS, Tampa Electric Company proposed to utilize fine mesh screens on the proposed Big Bend Unit 4 intake structure and the existing Unit 3 intake structure. Aquatic studies conducted prior to the Draft EIS indicated an unacceptably high level of entrainment associated with the Big Bend Station (see Draft EIS, Appendices C and D). The fine mesh screen system, as a result, was designed to limit the entrainment of planktonic organisms for the entire proposed Big Bend Station (Units 1-4) to acceptable levels.

Organisms removed from the fine mesh screens would be returned via a sluicing mechanism to the Tampa Bay system. The canal immediately north of the Big Bend Station was originally proposed as the location to receive the screened organisms. However, dye studies conducted since publishing the Draft EIS have indicated that organisms returned to this location would have a high potential for being re-entrained into the Big Bend Station intake. Consequently, alternatives to this location have been investigated. A summary of the conclusions of the investigation are presented in this section.

3.3.1 ENGINEERING EVALUATION OF ALTERNATIVE LOCATIONS

Tampa Electric Company evaluated the engineering potential for several alternative organism return locations. The locations are shown in Figure 3-2 and the evaluation results are described below and outlined in Table 3-1.

Location I

Location I is the eastern end of the canal north of the Big Bend Station intake canal. The routing distance from the intake structure is approximately 1,800 feet and is relatively obstruction free. The distance, topography, and relatively few obstructions allow for a gravity flow system to this location. Cost of construction for this location is $500,000. This is essentially the alternative described in the Draft EIS.

Location II

Location II is the north Apollo Beach embayment, just south of the plant discharge canal. The canal is separated from the embayment by a sheetpile wall. Routing to this location offers two potentials. Route A would be a nearly direct line from the plant intake to the release point parallel and adjacent to the east end of the main plant structure. Due to its proximity to the plant, the route would traverse congested areas. This route may allow for a gravity flow system. Route B would head east from the intake structure then south on the east side of the Unit 4 FGD system and then west to the release point. The length of this route, 4,900 feet, may dictate the need for pumping. The cost of this route is approximately $1,300,000. The cost for Route A is $500,000, assuming pumping is not required.

Location III

Location III is just west of the breakwater off Fish Hook Key. This route would be 8,400 feet long and would require pumping. The estimated cost for this option is $2,500,000.

Location IV

Location IV is the east end of the canal north of the Agrico facility. The routing distance to this location is 6,700 feet. This option would require pumping and would cost $1,900,000.

Based on economics, construction, and maintenance considerations, Location I would appear to be the most favored site for the organism return system release point. Location II would appear to be the second most favorable release point. Locations III and IV would appear to be the least favorable.

The results of dye studies have indicated a high re-entrainment potential for Location I. Location II, in the Apollo Beach northern embayment south of the Big Bend Station, is considered to have a low re-entrainment potential. Consequently, Location II may be an environmentally acceptable release point.

3.3.2 DESCRIPTION OF APOLLO BEACH NORTHERN EMBAYMENT

The northern embayment is an extremely shallow environment fringed with mangroves on the eastern reaches and with a system of seawalled canals to the south. The canals are deep (10 to 15 feet) but other areas in the embayment are shallow (2 to 5 feet). An extensive system of mosquito ditches (overgrown with mangroves) exists between the canals and the shallow embayment. To the north, the embayment is shielded by a metal sheetpile wall to prevent direct exchange of heated water from the station's cooling water discharge. Backflush of the thermal plume into the embayment does, however, occur on an intermittent basis. The sediments in the embayment are intermixed with clean sand and shell. The canals, however, contain extremely silty sediments. Shallow areas of the embayment contain patchy Ruppia (widgeon grass).

Several aquatic studies have been conducted in the embayment area since 1970. The results of a 1976-1977 study (Mahadevan et al., 1977) indicated benthic species composition and community information in the area were uniform and similar to the nearshore open Tampa Bay environment. Results of the 1979 benthic study (Mahadevan et al., 1980) indicated that, in terms of species composition and faunal similarity, the northern embayment is similar to the nearshore bay but dissimilar to the open bay. However, based on community parameters (density, species richness, diversity) the embayment is quite similar to the open bay.

Analysis of sediment samples performed during the 1976-1977 aquatic study indicated the embayment substratum is similar to that of the open bay nearshore environment.

Although plankton have not been sampled in the embayment, plankton populations for several aquatic species are expected. Results of fish sampling indicated several species of fish (including the black drum, pinfish, striped mullet, spot, sheepshead minnow) use the embayment as a nursery area. The mangrove fringe and shallow waters seem to promote the occurrence of juveniles in the embayment.

The studies appeared to demonstrate that life stages of locally important game and sport fish could be found in the embayment, thus indicating movement of fish in and out of the area.

Based upon these studies and an engineering feasibility review, Location II would appear to be suitable and acceptable as the release point for the organism return system.

Table 3-1. Potential alternative organism return locations

Alternative Location	Length of Travel	Cost ($1,000)	Comments
I	1,800'	500	
II-Route A	1,800'	500	Gravity Flow, $50,000 Additional for Pumping
II-Route B	4,900'	1,300	
III	8,400'	2,500	Includes Cost of Sealing Breakwater
IV	6,700'	1,900	

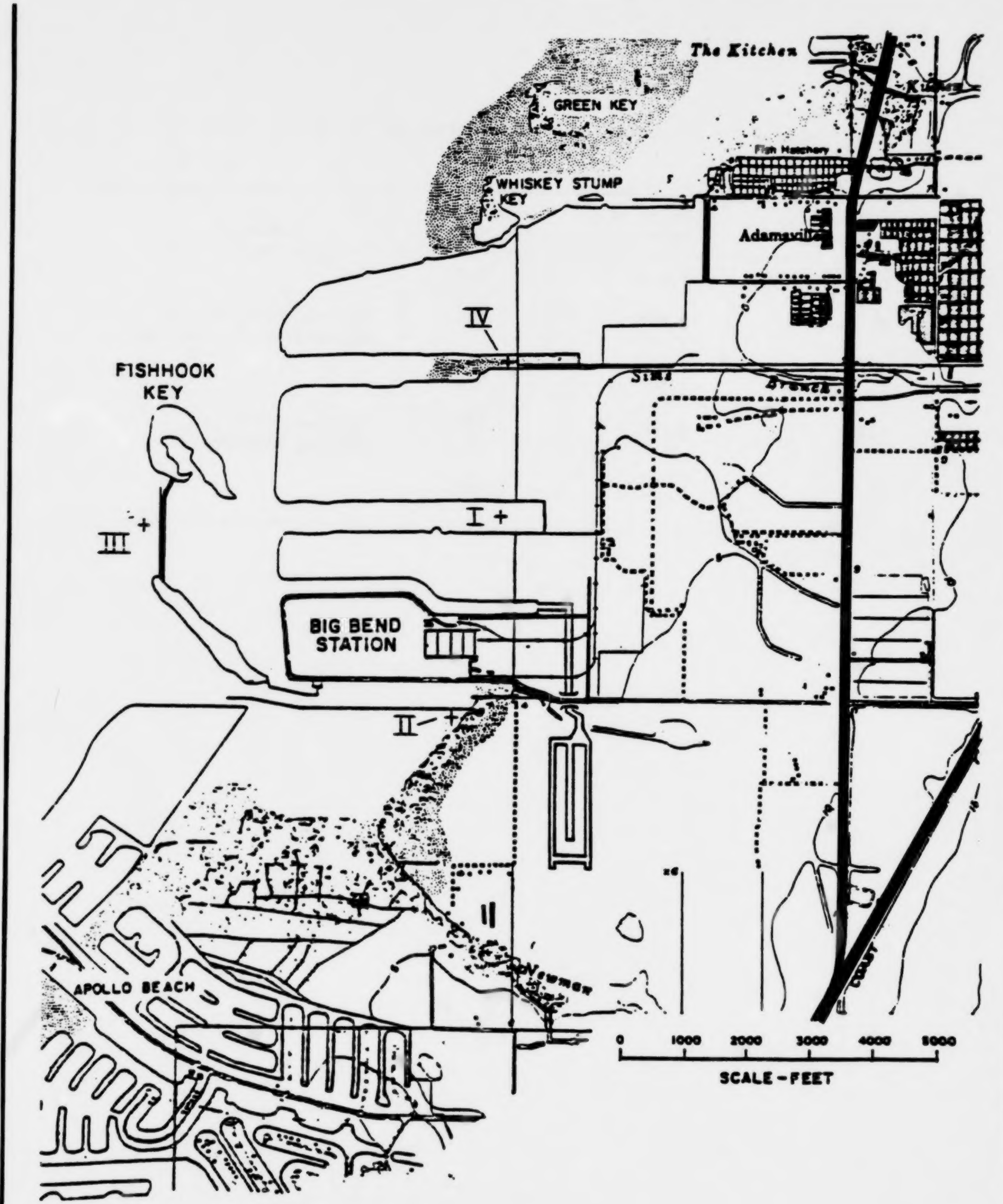

The Kitchen
GREEN KEY
Fish Hatchery
WHISKEY STUMP KEY
Adamsville
IV
FISHHOOK KEY
Sims Branch
I +
III +
BIG BEND STATION
II
II
APOLLO BEACH
0
1000
2000
3000
4000
5000
SCALE - FEET

Figure 3-2. Potential organism release locations.

Chapter 4
PUBLIC PARTICIPATION

The Draft Environmental Impact Statement (DEIS) was published in July 1981 and was made available to the public on July 10, 1981. The Federal Register, Volume 46, Number 137, Page 37084, dated July 17, 1981, announced the availability of the DEIS and the proposed issuance of an NPDES Permit. The DEIS was provided to various Federal, state, and local agencies, as well as concerned individuals, interest groups, and public officials. A public notice of the document's availability and of a public hearing on the DEIS appeared in the Tampa Tribune and the Sarasota Herald Tribune on July 16, 1981.

The public hearing was held in Ruskin, Florida, on August 19, 1981. In addition to the public input afforded by the hearing (transcript provided herein), many letters were received and are included in this Final EIS.

The designations in the margins of the letters identify specific comments for which responses have been developed. These responses follow the letters. In a similar manner, the designations in the margins of the hearing transcript identify comments which have received responses. Many of the transcript comments were similar or identical to the written; consequently, some transcript responses refer to responses to written comments already presented.

Index to comments on TECO Big Bend Unit 4 DEIS (Sheet 1 of 6)

Comment number	Comment page number	Response page number	Commentor	Date	Nature of comment
			Written comments		
FDA-1	4-11	4-167	Florida Department of Agriculture and Consumer Services	7/15/81	Recommend TECO contact local County Forester when planning revegetation at site
SCS-1	4-12	4-167	Soil Conservation Service	8/19/81	No comment
DER-1	4-13	4-167	Florida Department of Environmental Regulation	8/20/81	Conditions of certification
DER-2	4-13	4-167	Florida Department of Environmental Regulation	8/20/81	Discharge of wash water from fine-mesh screens
COE-1	4-15	4-167	U.S. Army Corps of Engineers	8/21/81	Dredge and fill permits
CDC-1	4-16	4-167	Center for Disease Control	8/27/81	Vector-borne diseases and control program
CDC-2	4-16	4-167	Center for Disease Control	8/27/81	Variance to water quality standards
CDC-3	4-17	4-168	Center for Disease Control	8/27/81	Thermal plume and discharge canal
CDC-4	4-17	4-168	Center for Disease Control	8/27/81	Unused cooling pond
CDC-5	4-17	4-168	Center for Disease Control	8/27/81	Impacts on mangrove area
CDC-6	4-17	4-169	Center for Disease Control	8/27/81	Impacts on manatee
WMD-1	4-19	4-169	Southwest Florida Water Management District	8/31/81	Supports siting plant on coast
WMD-2	4-19	4-169	Southwest Florida Water Management Distict	8/31/81	Consumptive use of freshwater

Index to comments on TECO Big Bend Unit 4 DEIS (Sheet 2 of 6)

Comment number	Comment page number	Response page number	Commentor	Date	Nature of comment
Written comments (continued)					
TECO-1	4-21	4-169	Tampa Electric Company	9/1/81	Acoustic impacts
TECO-2	4-22	4-169	Tampa Electric Company	9/1/81	Chlorine residuals
TECO-3	4-23	4-170	Tampa Electric Company	9/1/81	Variance to water quality standards
TECO-4	4-25	4-170	Tampa Electric Company	9/1/81	Alternate treatment system for metals
TECO-5	4-26	4-170	Tampa Electric Company	9/1/81	Liner of fly-ash pond
TECO-6	4-26	4-170	Tampa Electric Company	9/1/81	EPA recommended mitigative measures
TECO-7	4-27	4-170	Tampa Electric Company	9/1/81	Noise impacts
TECO-8	4-27	4-170	Tampa Electric Company	9/1/81	FGD blowdown discharge
TECO-9	4-28	4-170	Tampa Electric Company	9/1/81	Ground-water monitoring program
TECO-10	4-28	4-171	Tampa Electric Company	9/1/81	Variance to water quality standards
TECO-11	4-29	4-171	Tampa Electric Company	9/1/81	Net limits for discharges from slag pond
TECO-12	4-29	4-171	Tampa Electric Company	9/1/81	Variance to water quality standards
TECO-13	4-30	4-171	Tampa Electric Company	9/1/81	Correction to discussion of BACT
TECO-14	4-31	4-171	Tampa Electric Company	9/1/81	Conformance to NSPS for air quality
TECO-15	4-31	4-171	Tampa Electric Company	9/1/81	Sulfur dioxide potential emission rate
TECO-16	4-31	4-171	Tampa Electric Company	9/1/81	Final Conditions of Certification
TECO-17	4-32	4-171	Tampa Electric Company	9/1/81	Update copy of Chapter 17-3

Index to comments on TECO Big Bend Unit 4 DEIS (Sheet 3 of 6)

Comment number	Comment page number	Response page number	Commentor	Date	Nature of comment
			Written comments (continued)		
HEC-1	4-89	4-171	Hillsborough Environmental Coalition	9/1/81	Conservation
HEC-2	4-91	4-192	Hillsborough Environmental Coalition	9/1/81	Clarification of some SO_2 information
HEC-3	4-91	4-192	Hillsborough Environmental Coalition	9/1/81	Clarification of some particulate matter information
HEC-4	4-92	4-192	Hillsborough Environmental Coalition	9/1/81	Impacts of acid rain
HEC-5	4-92	4-193	Hillsborough Environmental Coalition	9/1/81	Impacts of thermal discharges
HEC-6	4-92	4-194	Hillsborough Environmental Coalition	9/1/81	Impacts of heavy metals in solid waste
HEC-7	4-92	4-194	Hillsborough Environmental Coalition	9/1/81	Add fine-mesh screens to Units 1 and 2
DOI-1	4-92	4-194	U.S. Department of the Interior	9/3/81	Mineral resources in area
DOI-2	4-98	4-194	U.S. Department of the Interior	9/3/81	Impacts on manatee
CR-1	4-98	4-195	Clearinghouse Review	9/4/81	Project conforms to Areawide Water Quality Management Program
CR-2	4-100	4-195	Clearinghouse Review	9/4/81	Minimization of impacts
CR-3	4-100	4-195	Clearinghouse Review	9/4/81	Socioeconomic impacts
CR-4	4-100	4-195	Clearinghouse Review	9/4/81	Minimization of impacts, continued biological studies recommended

Index to comments on TECO Big Bend Unit 4 DEIS (Sheet 4 of 6)

Comment number	Comment page number	Response page number	Commentor	Date	Nature of comment
Written comments (continued)					
CR-5	4-102	4-195	Clearinghouse Review	9/4/81	Compatibility with existing plans
SC-1	4-103	4-195	Sierra Club	9/14/81	Impacts on marine biota
SC-2	4-103	4-195	Sierra Club	9/14/81	Hydrothermal mathematical model of discharge plume
SC-3	4-103	4-195	Sierra Club	9/14/81	Water quality impacts
SC-4	4-103	4-195	Sierra Club	9/14/81	Section 316 Demonstration
SC-5	4-103	4-196	Sierra Club	9/14/81	Conservation as an alternative
SC-6	4-103	4-196	Sierra Club	9/14/81	Conservation and renewable resources as alternatives
SC-7	4-103	4-196	Sierra Club	9/14/81	Conservation as an alternative
Transcript comments					
TECO-1	4-226	4-273	Tampa Electric Company	8/19/81	Air quality impacts
TECO-2	4-226	4-273	Tampa Electric Company	8/19/81	Air quality impacts
TECO-3	4-227	4-273	Tampa Electric Company	8/19/81	Air quality impacts
GCR-1	4-235	4-273	Gloria C. Rains	8/19/81	Need and conservation considerations
GCR-2	4-236	4-273	Gloria C. Rains	8/19/81	Overall impacts
GCR-3	4-237	4-273	Gloria C. Rains	8/19/81	Impact on rates
GCR-4	4-237	4-274	Gloria C. Rains	8/19/81	Flooding potential
GCR-5	4-237	4-274	Gloria C. Rains	8/19/81	Air quality impacts
GCR-6	4-238	4-274	Gloria C. Rains	8/19/81	Impacts on surface water and ground water
GCR-7	4-238	4-274	Gloria C. Rains	8/19/81	Ground-water impacts
GCR-8	4-239	4-277	Gloria C. Rains	8/19/81	Solid waste

Index to comments on TECO Big Bend Unit 4 DEIS (Sheet 5 of 6)

Comment number	Comment page number	Response page number	Commentator	Date	Nature of comment
			Transcript comments (continued)		
GCR-9	4-239	4-277	Gloria C. Rains	8/19/81	Impacts on surface water and ground water
GCR-10	4-239	4-278	Gloria C. Rains	8/19/81	Surface water impacts
GCR-11	4-240	4-278	Gloria C. Rains	8/19/81	Variance to water quality standards
GCR-12	4-240	4-278	Gloria C. Rains	8/19/81	Impacts of thermal plume
GCR-13	4-240	4-278	Gloria C. Rains	8/19/81	Entrainment impacts
GCR-14	4-241	4-279	Gloria C. Rains	8/19/81	Acid rain
GCR-15	4-241	4-279	Gloria C. Rains	8/19/81	Overall impacts
GCR-16	4-241	4-279	Gloria C. Rains	8/19/81	Wastewater treatment
ST-1	4-244	4-279	Sally Thompson	8/19/81	Conservation
RP-1	4-245	4-279	Richard Paul	8/19/81	Acid rain
RP-2	4-245	4-279	Richard Paul	8/19/81	Impacts of thermal plume
RP-3	4-246	4-279	Richard Paul	8/19/81	Impacts of heavy metal contamination
RP-4	4-246	4-279	Richard Paul	8/19/81	Fine-mesh screens
MK-1	4-248	4-279	Michael Kenney	8/19/81	Air quality impacts
MK-2	4-248	4-279	Michael Kenney	8/19/81	Air quality impacts
MK-3	4-249	4-280	Michael Kenney	8/19/81	Air quality impacts
MK-4	4-249	4-280	Michael Kenney	8/19/81	Air quality impacts
MK-5	4-250	4-280	Michael Kenney	8/19/81	Air quality impacts
LR-1	4-250	4-280	Laurie Rask	8/19/81	Alternative actions and conservation

Index to comments on TECO Big Bend Unit 4 DEIS (Sheet 6 of 6)

Comment number	Comment page number	Response page number	Commentor	Date	Nature of comment
Transcript comments (continued)					
JM-1	4-252	4-280	Julie Morris	8/19/81	General comment
JM-2	4-252	4-280	Julie Morris	8/19/81	Conservation
JM-3	4-253	4-280	Julie Morris	8/19/81	Electrical use patterns
JM-4	4-253	4-280	Julie Morris	8/19/81	Conservation
JM-5	4-254	4-280	Julie Morris	8/19/81	Reserve capacity
JM-6	4-254	4-281	Julie Morris	8/19/81	Conservation and oil displacement
BC-1	4-257	4-281	Barney Capehart	8/19/81	Alternative energy sources
BC-2	4-257	4-281	Barney Capehart	8/19/81	Conservation

4.1 WRITTEN COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT AND RESPONSES TO WRITTEN COMMENTS

The written comments received from the following sources are reproduced in this section:

Florida Department of Agriculture & Consumer Services
U.S. Soil Conservation Service
Florida Department of Environmental Regulation
Corps of Engineers
Center for Disease Control
Southwest Florida Water Management District
Tampa Electric Company
Hillsborough Environmental Coalition
U.S. Department of the Interior
Clearinghouse Review
Sierra Club

Responses to these comments are also included.

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STATE OF FLORIDA **FLORIDA DEPARTMENT OF AGRICULTURE & CONSUMER SERVICES**

DOYLE CONNER COMMISSIONER * DIVISION OF FORESTRY / COLLINS BUILDING / TALLAHASSEE 32304

FREP
EIS
POWER PLANTS,
SUBSTATIONS, ETC.

July 15, 1981

Mr. Dario J. Dal Santo
EIS Project Officer
U. S. Environmental Protection Agency
Region IV
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Dear Mr. Dal Santo:

This is in response to your recent transmittal of the Draft Environmental Impact Statement for the proposed construction of a new electrical generating plant, Big Bend Unit 4, Tampa Electric Company.

We have reviewed the document for forestry and have no particular problems with the proposal. We suggest Tampa Electric contact our local County Forester, Robert Der, when they begin to lay-out their landscape proposals. He may be able to assist them with native trees from our nurseries and advice on planting them. He may be reached at 5339 SR579, Seffner, Florida, 33584 (telephone: 813/621-5605). **FDA-1**

We appreciate the opportunity to review the draft EIS. If we can be of any assistance, feel free to call on us.

Sincerely yours,

George L. Reinert, Chief
Forest Resource & Economic Planning Bureau

cc: District Forester Mark Hebb, Lakeland
County Forester Robert Der, Seffner

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United States
Department of
Agriculture

Soil
Conservation
Service

State Office
P. O. Box 1208
Gainesville, FL 32602

August 19, 1981

Dario J. Dal Santo
EIS Project Office
EPA-Region IV
345 Courtland Street, NE
Atlanta, GA 30365

Dear Mr. Dal Santo:

SCS-1 We have no comments concerning the draft Environmental Impact Statement for Tampa Electric Company, Big Bend, Unit 4.

Sincerely,

James W. Mitchell
State Conservationist

cc:
Norman A. Berg, Chief, Soil Conservation Service, USDA, Washington, D.C.

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

August 20, 1981

Mr. Walter Kolb
Senior Governmental Analyst
Office of Planning and Budgeting
Office of the Governor
415 Carlton Building
Tallahassee, Florida 32301

Re: DEIS - Tampa Electric Company
Big Bend Unit 4, SAI FL8107230120-E

Dear Mr. Kolb:

The Department of Environmental Regulation has reviewed the Draft Environmental Impact Statement for TECO's Big Bend Unit 4. This power plant unit was reviewed and certified pursuant to the Florida Electrical Power Plant Siting Act. On August 4, 1981, the Governor and Cabinet sitting as the Siting Board approved the certification of the coal-fired unit.

In reviewing the DEIS we noted that page F-11 does not correspond exactly to page 8 of the existing conditions of certification for Big Bend 4. A correct copy of that page is attached. It was also noted that pages G-5 through G-8 are duplicates of pages G-1 through G-4.

DER-1

ERRATA

The draft NPDES permits for Big Bend Unit 4 and for Units 1-3 contained in Appendices A and B respectively do not specifically provide for discharge of fine mesh screen washwater and organisms to the Organism Return Canal. However, a provision for this discharge is made in DER Condition XXVIII as shown on

DER-2

ENVIRONMENTAL IMPACT STATEMENT BRANCH
RECEIVED
AUG 24 1981
REGION IV - EPA

page F-25 of the DEIS. As DER will submit a 401 water quality certification to EPA contingent upon inclusion of the Conditions of Certification approved by the Governor and Cabinet, this issue will be addressed.

Sincerely,

Hamilton S. Oven, Jr

Hamilton S. Oven, Jr., P.E.
Administrator
Power Plant Siting

HSO:sb

cc: John Outland
Mickey Bryant
Dario Dal Santo
Charles Kaplan

DEPARTMENT OF DEFENSE

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT. CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE. FLORIDA 32232

SAJPD-ES

21 August 1981

Mr. John E. Hagan, III
Chief, EIS Branch
U.S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Hagan:

In reference to Public Notice No. PH81FL167, dated July 16, 1981, pertaining to the Draft Environmental Impact Statement on Tampa Electric Company's proposed Big Bend Unit Number 4 to be constructed near Tampa in Hillsborough County, Florida (NPDES FL0000817/FL0037044), the Corps of Engineers is preparing to take final action on the dredge and fill permits noted on page IX as soon as notification that the EIS has been filed is published in the Federal Register. Restoration of Jackson Branch is included in the permit along with the indicated intake and discharge structures. **COE-1**

Sincerely,

A J Salem
A. J. SALEM
Acting Chief,
Planning Division

DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service

Centers for Disease Control
Atlanta, Georgia 30333
(404) 262-6649

August 27, 1981

Mr. John Hagan
Chief, EIS Branch
U.S. Environmental Protection
  Agency, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: FL0000817 and/or FL0037044

Dear Mr. Hagan:

We have reviewed the Draft Environmental Impact Statement (EIS) for the Proposed Issuance of a New Source National Pollutant Discharge Elimination System Permit to Tampa Electric Company - Big Bend Unit 4 in Hillsborough County, Florida. We are responding on behalf of the Public Health Service and are offering the following comments for your consideration in preparing the final document.

CDC-1 It is important that this proposal not be allowed to increase any local vector populations capable of causing vector-borne disease or nuisance problems. The EIS should include a historical discussion of vector-borne disease and nuisance problems that have occurred in the area and the local efforts to mitigate these problems. In view of the potential vector habitat areas to be created by the applicant, we recommend that a vector control management plan be developed by the applicant and that it be approved by the local health department. The EIS should address the project's potential vector-borne impacts and include a commitment that a vector control management plan will be developed and implemented by the applicant for the life of the project.

CDC-2 According to the EIS, ambient levels of several metals in Hillsborough Bay and in the intake canal violate State of Florida Water Quality Standards. Since the discharge of these waters, after using them for cooling purposes, would also violate applicable water quality standards, the applicant has applied for a variance from the standards in order to have a discharge that does not violate applicable standards. Is this variance for the point of discharge or for the boundary of a mixing zone? Will the variance be written in such a way that no degradation of ambient water quality (with the exception of a thermal mixing zone) will be permitted at the point of discharge? If so, will the variance be flexible enough to demand an improvement in the quality of the discharge if an improvement occurs in the quality of the intake water?

We understand that the applicant's proposed waste heat rejection system is once-through cooling with fine-mesh screens on Units 3 and 4 and no dilution. Waters, after passing through the condenser, will exit to the existing discharge channel and combine with discharge waters from Units 1, 2 and 3. Inspection of the isothermal contour maps (Figures 3-37 and 3-38) reveal as much as a 7 to 8 degree rise in temperature at the point of discharge. Do the iosthermal maps realistically depict the expected thermal plume configuration? Is any portion of the thermal plume expected to hug the shore? The EIS should describe how the expected plume relates to the designated mixing zone and whether the temperature rise at the boundary of the mixing zone will comply with Subsection 17-3.05 (1)(c)(ii), Thermal Surface Water Criteria, of the Florida Water Quality Standards. **CDC-3**

We believe the EIS should evaluate the effect that the westerly discharge has upon the quality and circulation of embayment waters between the discharge channel of Big Bend and Apollo Beach. The isothermal contour maps (Figure 3-37) reveal thermal mixing to occur only westward of Apollo Beach. Will or is the "discharge channel" designed to prevent any mixing in the embayment even during tide changes? Several figures in the EIS portray a steel sheet-pile wall extending along the discharge channel to the mouth of the embayment. Has consideration been given to extending this wall beyond the mouth of the embayment to preclude unnecessary mixing with embayment waters?

— — —

It would also be helpful to explain why the cooling pond shown on Figure 3-7 is to be replaced by a bottom ash disposal pond when interior land is available. Couldn't this cooling pond continue to provide cooling benefits, especially if it is used in conjunction with the discharge channel? **CDC-4**

Please indicate how much of the original mangrove community exists. The EIS should explain in detail the ecologic significance and relative importance of the affected mangrove community and the remaining embayment with that of other areas on the coast. The economic and recreational benefits that this area provides in terms of fisheries (spawning, nursery feeding, fishing grounds, etc.) and other activities should be highlighted in the EIS. With the knowledge that tidal currents in Hillsborough are "generally weak", will the discharge currents (page 2-51) affect the ingress and egress of fauna to and from the embayment? **CDC-5**

Since "use of the area by manatees may increase with the increase in thermal discharges...", the EIS should address the potential conflicts that might occur with manatees and motorboats as development increases in Apollo Beach. Since the power plant discharge will serve as an attraction for manatee, consideration should be given now to developing mitigation measures to prevent any possible future problems from occurring. **CDC-6**

We appreciate the opportunity to review this EIS for its relevance to public health and welfare. Please send us one copy of the final document when it becomes available. Should you have any questions regarding our comments, please contact Robert Kay of my staff at (404) 262-6649.

Sincerely yours,

Frank S. Lisella, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Division
Center for Environmental Health

**Southwest Florida
Water Management District**

5060 U.S. HIGHWAY 41, SOUTH — BROOKSVILLE, FLORIDA 33512
PHONE (904) 796-7211

BRUCE A. SAMSON, Chairman, Tampa
Wm. O. STUBBS, JR., Vice Chairman, Dade City
JAMES CAMPBELL, Secretary, Plant City
RONALD B. LAMBERT, Treasurer, Wauchula

B. T. LONGINO, Sarasota
CLIFF STEPHENS, Clearwater
DON CRANE, St. Petersburg

JIM KIMBROUGH, Brooksville
ARCH UPDIKE, JR., Lake Wales

WILLIAM C. TATUM, Executive Director

August 31, 1981

Mr. John E. Hagan, III
Chief, EIS Branch
U. S. Environmental Protection Agency
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Re: Public Notice No. PH81FL167
NPDES Nos. FL0000817/FL0037144
Tampa Electric Company's proposed
Big Bend Unit No. 4 Power Plant

Dear Mr. Hagan:

Southwest Florida Water Management District supports Tampa Electric Company's proposed use of once-through cooling for Big Bend Unit No. 4 Power Plant in Hillsborough County, Florida.

This District has supported and continues to support the use of once-through cooling for existing units 1-3 as well.

The Southwest Florida Water Management District is a special regional water management district and is comprised of part or all of sixteen counties in the Southwestern part of the state. TECO Big Bend Unit No. 4 is located in the central portion of our district.

This District, by law and by delegation from the Florida Department of Environmental Regulation, is charged with the responsibility of managing the regional water resources. A comprehensive program regulating and limiting consumptive uses of fresh water within the district has been in effect since 1975.

The fresh water resources within the district are limited since the sole source of supply is rainfall. There are no streams or rivers which carry fresh water into our district from other watershed basins. The entire western boundary of the district is contiguous with the Gulf of Mexico and the fresh water aquifers are all underlain by deeper, highly mineralized, non-potable waters. In a very real sense, peninsular Florida is hydrologically analogous to an island at sea. The fresh water available in the ground is a relatively shallow lens floating on deeper, non-potable water.

This portion of the State of Florida has seen a tremendous growth in population in recent years and a corresponding growth in demand for consumption and use of the available fresh water resources. Our best projections indicate that this trend will continue and the available supply will be ever shrinking. From time to time, site specific shortages of fresh water have occurred and during especially dry conditions fresh water use has been limited or curtailed.

All of the foregoing is relevant to TECO Big Bend Unit 4 because it is against this background that the Governing Board of this District determined in December, 1973, that it would consistently oppose the location of electric power generating plants on inland locations. The large scale consumptive use of limited fresh water supplies for power plant cooling purposes would prevent use of that same water for other, more beneficial, consumptive and non-consumptive purposes. The consequences of this could be far reaching and severe. Instead, this district supports the location of electric power generating plants along the coastline and urges each electric utility to use the virtually unlimited supply of saline and brackish water from the coastal location for cooling purposes. For this reason, this district supports TECO's proposed use of once-through cooling for Unit 4, as well as for existing units 1-3. **WMD-1**

This district is also concerned with consumptive uses proposed for the subject plant other than for cooling purposes. The materials we have received concerning the proposed environmental impact statement indicate that potable fresh water from the public supply system of Hillsborough County will be used exclusively for boiler makeup water and other consumptive uses (aside from cooling exhaust steam). This portion of the EIS may be somewhat misleading since TECO is obligated by the final order of the Governor and Cabinet of the State of Florida in the state site certification proceeding to use the lowest quality water which it has the ability to use. To the extent that a dependable supply of non-potable water can be provided, TECO is obliged to use non-potable water in lieu of potable water whereever possible. **WMD-2**

If TECO can demonstrate that non-potable water is not available due to technical or environmental reasons, then the use of potable water from the public water supply system of Hillsborough County may be authorized by the Secretary of DER, upon the concurrence of this district. We suggest that this portion of the EIS be modified to be consistent with the site certification order of the Governor and Cabinet of this state.

We appreciate the opportunity to provide these comments and urge that they be considered in the formulation of final determinations regarding the final environmental impact statement and the proposed NPDES permits.

Sincerely yours,

Bill

WILLIAM C. TATUM
Executive Director

WCT/dl

cc: Lawrence N. Curtin, Esquire
Victoria Tschinkel, Secretary, DER

COMMENTS OF TAMPA ELECTRIC COMPANY ON DRAFT ENVIRONMENTAL IMPACT STATEMENT, DRAFT NPDES PERMIT AND PRELIMINARY DETERMINATION ON THE PSD PERMIT FOR BIG BEND UNIT NO. 4 AND DRAFT NPDES PERMIT FOR BIG BEND UNITS 1, 2 AND 3

I. EXECUTIVE SUMMARY

Section 4., Page X, Paragraph 2 - The last sentence of this paragraph notes that acoustic impacts should be minimal and would be associated primarily with setting of the steam valves. In addition to this activity, Tampa Electric Company will engage in a steam blowing operation prior to initial startup of Unit No. 4. The steam blowing activity is recommended by the manufacturer to insure against damage to the steam turbine upon startup of the Unit. The entire steam blowing operation occurs only once in the life of the plant and will span a period not to exceed 30 days. Since it is not possible to accurately predict the noise levels that will be experienced during the steam blowing operation, Tampa Electric Company requested a variance from Hillsborough County Environmental Protection Commission noise regulations in the State Site Certification proceedings held pursuant to the Florida Electrical Power Plant Siting Act. On August 17, 1981, the Florida Governor and Cabinet entered an order certifying the construction and operation of Big Bend Unit No. 4 and granting a variance from the Hillsborough County Environmental Protection noise **TECO-1** regulations for a period not to exceed thirty days from the commencement of the steam blowing operation. A copy of the order and the final Conditions of Certification is attached (Attachment 1). In addition to the variance, Tampa Electric Company will engage in a public awareness campaign prior to commencing the steam blowing activity to forewarn the public of the estimated time and duration of the noise.

TECO-2 Section 4., Page XI, Paragraph 3 - The discussion indicates that chlorine will be used to prevent biofouling of condenser tubes and will be discharged at maximum levels of 0.2 mg/l, expressed as total residual oxidants (TRO). The discussion also notes that detailed die-away studies are to be conducted prior to the Final Environmental Impact Statement to assure that a 0.01 mg/l TRO level can be achieved in the 6.1 acre discharge canal. The 6.1 acre figure refers to the size of the chlorine mixing zone that has been recommended by the Florida Department of Environmental Regulation and approved by the Florida Governor and Cabinet on August 17, 1981, rather than the size of the discharge canal. This mixing zone is entirely contained within the discharge canal for the Big Bend Station. On July 16, 1981, after release to the public of the Draft Environmental Impact Statement, Tampa Electric Company began work on the die-away study. The Company began taking chlorine readings on the second day of the study.

Chlorine residuals at the point of discharge were not detectable. Further testing at increased chlorine feed rates yielded the same results. After consideration of these results and discussions with representatives of Region IV of the Environmental Protection Agency (EPA), the study was terminated. It was concluded that the high intake temperature of the water along with extreme biological activity in the circulating water intake created a considerably high chlorine demand in the condenser cooling water, such that no chlorine was detectable in the discharge canal. Due to the circumstances encountered during the test, Tampa Electric Company proposed to EPA representatives to suspend all efforts to continue with the chlorine die-away study until chlorine residuals are read at the point of discharge as indicated by routine weekly monitoring reports.

TECO-3 Section 6, Page XIII - The discussion indicates that Tampa Electric Company is pursuing a variance request from certain Florida water quality standards criteria with the Florida Department of Environmental Regulation and the EPA. It further notes that a preliminary recommendation for approval of a two-year variance has been received, but that the approval has not yet been finalized. Since release of the Draft Environmental Impact Statement, the Florida Governor and Cabinet on August 17, 1981, approved a two-year variance from the Florida water quality standards for discharges from Unit No. 4 as requested by Tampa Electric Company. This is the final state approval required for variance relief for Unit No. 4 (See Attachment 1). Tampa Electric Company has also received a Recommended Order from the State Hearing Office assigned the variance matters recommending that the variance request for the discharge from the Units 1, 2 and 3 slag pond be granted by the Florida Department of Environmental Regulation. A copy of this Recommended Order is attached (Attachment 2). Final approval has not yet been received from the Department of Environmental Regulation, but is expected in the near future.

In the second paragraph under this section, it is noted that the Company is pursuing a variance request from local water quality standards through the Florida Department of Environmental Regulation and the Hillsborough County Environmental Protection Commission and that this issue is unresolved. For Unit No. 4, the August 17, 1981, order of the Governor and Cabinet also grants the variance from Hillsborough County Environmental Protection Commission water quality standards. This approval has been granted for the life of the Big Bend Unit No. 4 facility certification and is the final approval necessary for that variance request.

The third paragraph under Section 6 indicates that the proposed level of chlorine discharges of 0.2 mg/l expressed as total residual oxidants (TRO) has not yet been resolved as being an acceptable limitation to adequately protect the aquatic organisms in the Big Bend Station discharge canal. We note that the Florida Governor and Cabinet approved the limit of 0.2 mg/l for Big Bend Unit No. 4.

II. CHAPTER 2

ERRATA Page 2-23, Figure 2-4 - This figure is the plot plan for the Big Bend Station and contains the locations of each NPDES outfall from the station. Outfall No. 001 is incorrectly located on this figure and the location should be modified as reflected in red on the attached plot plan (Attachment 3).

ERRATA Page 2-24, Figure 2-5 - This figure is the plant water balance for the Big Bend Station. This figure does not reflect the most up-to-date water balance for Big Bend Unit No. 4. The correct water balance is contained in the Draft NPDES Permit, Appendix A, Page A-13, of the Draft EIS.

TECO-4 Section 2.7, Pages 2-61,2-62 - The last paragraph of this section on Pages 2-61 and 2-62 includes a discussion of the variance request from Florida water quality standards criteria for Big Bend Unit No. 4 that was approved by the Florida Governor and Cabinet as a part of the Site

Certification for the Unit. This discussion states that the reevaluation of a filtration system to treat the metals which are the subject of the variance is under consideration. The Conditions of Certification which were approved by the Governor and Cabinet state that Tampa Electric Company will explore the practicability of treating the boiler blowdown in the Flue Gas Desulfurization system treatment system when there is capacity in the system to accommodate that blowdown. The variance conditions do not contain a discussion of reevaluation of filtration systems to treat the metals (See Attachment 1).

TECO-5 Section 2.7, Page 2-62, Paragraph 1 - The discussion indicates that the fly ash area will be lined with an impermeable material to prevent leachate contamination. Tampa Electric Company has stated that it will line the fly ash area with a material which has a permeability no greater than 10^{-7} centimeters per second. This is generally considered to be impermeable.

TECO-6 Section 2.7, Page 2-62, Paragraph 2 - This section contains a list of six separate mitigative measures not included as a part of Tampa Electric Company's project proposal but which are specifically recommended by EPA. The language of recommendations 4 and 6 in the text on this page differs from the language contained in the conditions in the Draft NPDES permit. This language should be made consistent with that contained in the conditions of the Draft NPDES permit in Appendix A of the Draft EIS.

III. CHAPTER 3

TECO-7 Section 3.1.2.3, Page 3-4 - This section contains a discussion of the noise impacts expected to be experienced during construction of Big Bend Unit No. 4. We note that the steam blowing operations referenced above have not been discussed. These operations, for which a final variance from Hillsborough County Environmental Protection Commission noise regulations has been granted by the Florida Governor and Cabinet, will occur only once during the life of the Unit during a period not to exceed thirty days prior to initial startup. Tampa Electric Company will engage in a public awareness campaign prior to this activity to forewarn the public of the estimated time and duration of the noise.

IV. APPENDICES

TECO-8 Appendix A, Page A-10 - Condition F. prohibits the discharge to waters of the United States of low volume wastes. We note that Flue Gas Desulfurization system blowdown will be discharged from Big Bend Unit No. 4 and that the draft permit elsewhere provides for this discharge. The Flue Gas Desulfurization system blowdown is considered to be a low-volume waste. Accordingly, this condition should be modified to reflect that Flue Gas Desulfurization system blowdown may be discharged to the circulating water system and then to the discharge canal in accordance with the limitations contained on Page A-74 of Appendix A for outfall No. 011.

TECO-9 Appendix A, Page A-10 - Requirement No. H. states that the Permittee shall implement a groundwater monitoring program approved by EPA and the State of Florida not later than one year prior to operation of Big Bend Unit No. 4 and that a detailed plan must be submitted prior to issuance of the Final EIS. Tampa Electric Company submitted a groundwater monitoring program to EPA for approval on July 28, 1981.

TECO-10 Appendix A, Page A-16 - Paragraph G. on this page contains a discussion of the Florida water quality standards criteria for which variance relief was requested by Tampa Electric Company. The discussion indicates that the State of Florida proposed to grant the variance for a two-year period and require that certain evaluations be performed. Since the Draft EIS was released to the public, the Florida Governor and Cabinet entered an order approving the certification of the site and granting the variance request of the Company. This is the final approval necessary for the variance. The language contained in Section G. should be amended to reflect the conditions imposed on Tampa Electric Company in the final Conditions of Certification. The appropriate language is found on Page 23 of the final Conditions of Certification which are attached to these comments (See Attachment 1).

TECO-11 Appendix B, Page B-5 - The limitations proposed for outfall No. 002 include net limitations for discharges of total suspended solids from the slag pond. Data collected subsequent to the establishment of the proposed net limitations have indicated the need to incorporate a provision in the final Draft NPDES permit that will allow for adjustment of the net limitations, either by increasing or decreasing those limits, when data indicate an adjustment is warranted. This issue will be addressed in more detail in a separate letter from Heywood A. Turner to Howard D. Zeller. We request that language be incorporated into the final Draft NPDES permit that authorizes adjustments to the net limitations.

TECO-12 Appendix B, Pages D-23, D-24 - Section II.B.1. contains a discussion of limitations for the slag pond discharge for existing Units 1, 2 and 3. That discussion indicates that Tampa Electric Company has requested a variance from certain water quality standards criteria from the State of Florida, Department of Environmental Regulation. It is also noted that the staff of the Department of Environmental

Regulation proposed to grant the variance for a period of two years. On June 23, 1981, a public hearing on Tampa Electric Company's variance request for Units 1 2, and 3 was held before State Hearing Officer Diane D. Tremor. On August 5, 1981, Hearing Officer Tremor entered a Recommended Order which recommends granting the variance relief requested by Tampa Electric Company. A copy of this Recommended Order is attached hereto (Attachment 2). Although the Florida Department of Environmental Regulation has not finally acted on the variance request, it is expected that approval will be granted in the near future. The language contained in Section II.B.1. should be amended to reflect the recommendation of the Hearing Officer, as adopted by the Florida Department of Environmental Regulation.

TECO-13 Appendix E, Page E-5 - In the discussion of best available control technology (BACT) for NO_x and CO, the sentence "An attachment to this preliminary determination summary specifies combustion control requirements to balance the tradeoffs between NO_x and CO emissions through the use of a flue gas oxygen or CO_2 monitor . . ." should be deleted since the attachment and requirements have been deleted from the preliminary determination as noted in EPA's response to Comment No. 3 on Page E-23.

TECO-14 Appendix E, Page E-14 (Condition No. 11) - The applicant will demonstrate compliance with new source performance standards requirements for percent reduction of potential sulfur dioxide emissions by monitoring coal characteristics and flue gas sulfur dioxide content and through other procedures established in 40 C.F.R., Subpart Da as discussed on Page E-4 of Appendix E. The BACT analysis assumed a 25% reduction in potential sulfur dioxide emissions (not sulfur) through coal washing and preparation. This assumption was based on coal washing data indicating 25% reduction is possible. However, should the coal washing and preparation not always provide 25% or greater reduction in potential sulfur dioxide emissions, flexibility has been designed into the control equipment to achieve an overall reduction in potential sulfur dioxide emissions of 90%. For these reasons, Condition No. 11. should be deleted.

TECO-15 Appendix E, Page E-17, Table 1 - The potential emissions of sulfur dioxide should be 15,552 tons per year to reflect the 0.82 pounds of sulfur dioxide per million BTU's of heat input emission rate.

TECO-16 Appendix F - Appendix F contains the Conditions of Certification for Big Bend Unit No. 4 recommended by the Department of Environmental Regulation as revised as of June 2, 1981. We note that these are not the most recent conditions and that the final Conditions of Certification as approved by the Florida Governor and Cabinet are attached to these comments (See Attachment 1).

TECO-17 Appendix K - Appendix K contains a reprint of Chapter 17-3, Florida Administrative Code, apparently current as of October 19, 1979. This is not the most up to date version of Chapter 17-3, Florida Administrative, and the Appendix should be revised to reflect the current Department of Environmental Regulation rules.

ATTACHMENT 1

BEFORE THE GOVERNOR AND CABINET
OF THE STATE OF FLORIDA

In The Matter Of: TAMPA ELECTRIC)
COMPANY POWER PLANT SITING APPLICATION,)
BIG BEND STATION UNIT #4 P.A. 79-12.) Case No. 80-1723
)

The following persons were present and participated in the disposition of this matter:

Honorable Bob Graham
Governor

Honorable George Firestone
Secretary of State

Honorable Jim Smith
Attorney General

Honorable Bill Gunter
Treasurer and Insurance Commissioner

Honorable Gerald A. Lewis
Comptroller

Honorable Doyle Conner
Commissioner of Agriculture

Honorable Ralph D. Turlington
Commissioner of Education

FINAL ORDER ADOPTING HEARING OFFICER'S RECOMMENDATION OF CERTIFICATION SUBJECT TO CONDITIONS

BY THE GOVERNOR AND CABINET:

The Governor and Cabinet, having heard presentation by the parties, reviewed the Recommended Order dated July 21, 1981, (attached and incorporated as Exhibit 1) as well as the special and general conditions referred to therein and attached thereto as Appendix I, and being otherwise fully advised herein, it is,

ORDERED:

1. The Recommended Order is approved and adopted.

2. The general and special conditions referenced therein and attached thereto as Appendix I are approved and adopted, and the certification of Big Bend Station Unit #4 is made specifically subject to those general and special conditions.

DONE AND ENTERED this 17 day of August 1981, subsequent to a vote of the Governor and Cabinet at a duly constituted Cabinet meeting of August 4, 1981.

FILING AND ACKNOWLEDGEMENT

FILED, on this date, pursuant to S120.52 (9), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

D. Quigg for Linda Bevard
Clerk

8-17-81
Date

FOR THE GOVERNOR AND FLORIDA CABINET:

BOB GRAHAM
Governor

VOTE:

FOR	AGAINST	ABSENT
Honorable George Firestone		Honorable Ralph D. Turlington
Honorable Jim Smith		Honorable Gerald A. Lewis
Honorable Bill Gunter		
Honorable Doyle Conner		

Copies furnished:

To all parties of record

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

IN RE: TAMPA ELECTRIC COMPANY POWER)
PLANT SITING APPLICATION, BIG)
BEND STATION UNIT 4 P.A. 79-12) Case No. 80-1723
)

RECOMMENDED ORDER

Pursuant to notice, an administrative hearing was held before Diane D. Tremor, Hearing Officer with the Division of Administrative Hearings, on June 23, 1981, at the Hillsborough County Courthouse in Tampa, Florida. The issue for determination at the hearing was whether the power plant siting application of Tampa Electric Company for the construction and operation of an electrical generating facility known as Big Bend Unit Number 4 proposed for Hillsborough County should be granted.

APPEARANCES AT THE HEARING

For TECO:
Lawrence N. Curtin
and Robert P. Murray
Holland and Knight
Post Office Drawer BW
Lakeland, Florida 33802

For DER:
Louis F. Hubener
Assistant General Counsel
Twin Towers Office Building
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Tallahassee, Florida 32301

For SWFWMD:
Thomas E. Cone, Jr.
Blain and Cone, P.A.
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OTHER APPEARANCES OF RECORD

For Department of Veteran
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For Florida Public
Service Commission:
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Public Service Commission
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Prentice C. Pruitt
Public Service Commission
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Tallahassee, Florida 32301

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Exhibit 1

INTRODUCTION

In August of 1980, Tampa Electric Company (TECO) filed with the Department of Environmental Regulation its application for power plant site certification for Big Bend Station Unit 4 in Hillsborough County, Florida. TECO has also requested certain variances from the surface water and ground water quality standards of the Department of Environmental Regulation (DER) and the surface water quality standards and noise level standards of the Hillsborough County Environmental Protection Commission. This Commission made no appearance at the hearing. A land use hearing was held on November 17, 1980, and the Governor and Cabinet, sitting as the Board under Chapter 403, Part II, Florida Statutes, entered an Order on February 19, 1981, concluding that the proposed site of Big Bend Unit No. 4 is consistent with existing land use plans and zoning ordinances and regulations.

Prior to the hearing, the parties filed with the undersigned a Prehearing Stipulation containing certain stipulated facts. All issues concerning certification for the proposed facility were settled by agreement of the parties prior to the hearing. Subsequent to the hearing, proposed findings of fact, proposed conclusions of law and a proposed recommendation was filed with the undersigned. This document constituted the joint effort of all parties with the exception of the Florida Public Service Commission which waived further participation in this proceeding after its order certifying the need for Big Bend Unit No. 4, pursuant to Section 403.519, Florida Statutes.

At the administrative hearing held on June 23, 1981, TECO presented the testimony of five witnesses and its Exhibits 1 through 29 were received into evidence. The witnesses presented by TECO were John B. Ramil, an engineer in the Environmental

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Planning Department at TECO; Wallace Wilcher, TECO's superintendent of the Big Bend Station; Steven Marks, accepted as an expert witness in the area of air quality and dispersion modeling; Stephen Jenkins, accepted as an expert witness in the area of pollution control, specifically, flue gas desulfurization and electrostatic precipitators; and Jerry L. Williams, manager of environmental planning for TECO. The DER presented the testimony of Hamilton S. "Buck" Oven, DER's administrator of power plant sitings, transmission line sitings and the review section of the Bureau of Permitting. Received into evidence were DER's Exhibits 1 through 3.

FINDINGS OF FACT

Upon consideration of the stipulations of fact and the oral and documentary evidence adduced at the hearing, the following relevant facts are found:

(1) The applicant is a duly authorized and registered Florida corporation engaged in the business of producing electrical power for sale. It proposes to construct and operate a 486 megawatt (gross) coal fired electrical generating facility immediately adjacent to its existing three coal fired units known as Big Bend Units 1, 2 and 3. The proposed site is located on the eastern shore of Tampa Bay near the mouth of the Hillsborough Bay (designated as a Class III waterbody), and is five miles north of Ruskin, ten miles south of Tampa and fourteen miles from St. Petersburg across Tampa Bay. As noted, the proposed unit will be the fourth unit at the applicant's existing Big Bend site and will share many of the service facilities with the existing units. The shared facilities include the coal dock, loading facilities, the coal storage area, the switchyard, and the existing wastewater treatment pond and spray irrigation field. The existing transmission line towers will

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be used by Unit No. 4, but approximately 3,000 feet of conductors will be installed to connect the new unit to the existing switchyard located just east of the existing station. Other associated facilities include storage and handling facilities for limestone necessary to operate the flue gas desulfurization system, storage and disposal areas for the by-product produced by that system and storage and disposal for ash. A spur from the Seaboard Coast Line Railroad to the site was constructed for previous projects and will be used in connection with construction of proposed Unit No. 4. An additional spur will be constructed entirely within the site boundaries and no offsite rail construction will be necessary.

2. As a primary energy source, proposed Unit No. 4 will burn high sulfur bituminous coal. The unit will be equipped with an electrostatic precipitator for the purpose of controlling the emission of particulates, and will also be equipped with a flue gas desulfurization system for the purpose of controlling emissions of sulfur dioxide. These pollution control devices have been determined by the Department of Environmental Regulation to constitute the "best available control technology." In order to prevent significant deterioration of air quality from the operation of Unit No. 4, various alternative strategies have been studied by TECO and its consultants. These studies demonstrate that the most economical strategy which will comply with state and federal regulations calls for the use of a 99.74% efficient electrostatic precipitator for the removal of particulate emissions, boiler and burner design for oxides of nitrogen and carbon monoxide and a system for the removal of sulfur dioxide which includes a flue gas desulfurization system, coal washing and retention of certain of the sulfur dioxide in the ash during combustion. The entire sulfur dioxide control system

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will provide a removal efficiency of 90 percent. Tampa Electric Company and its consultants have modeled and analyzed the projected effects of air pollution from proposed Unit No. 4. The evidence developed from such studies shows that the operation of Unit No. 4 as proposed pursuant to the attached conditions of certification will comply with State and federal standards for ambient air quality and the prevention of significant deterioration of air quality.

(3) Big Bend Unit No. 4 will generate three basic byproduct materials. These are fly ash, bottom ash and flue gas desulfurization byproduct. The fly ash generated by Unit No. 4 will be collected in the electrostatic precipitator prior to the boiler gas being discharged to the atmosphere. This material will be marketed as a raw material for the production of cement. However, in the event no market is available, provisions have been made to store fly ash at the site of Unit No. 4. The unsold fly ash will be sluiced to a settling pond and then ultimately transported to the final storage area. Bottom ash is the material resulting from cumbustion of coal which is collected at the bottom of the boiler. Bottom ash will be sluiced to a bottom ash area which will consist of a pond for settling the material and a final disposal area. The flue gas desulfurization system byproduct, a commerical grade gypsum, will be stored as necessary on site. It is anticipated that this will be a marketable product.

(4) Fresh water necessary to operate the facility, other than for cooling purposes, will be obtained from Hillsborough County. This fresh water will be used to supply make-up water to the boiler and in the flue gas desulfurization system. In addition, fresh water will be used to sluice ash and to service the sanitary facilities for the plant, for fire protection and for other limited miscellaneous uses. All such water will be

obtained off premises and no production wells will be owned or operated by Tampa Electric Company in connection with Unit No. 4. For some purposes, the applicant will use the lowest quality of water available from the County before drawing from the public potable water supply.

(5) Proposed Unit No. 4 will utilize a once through condenser cooling system and fine mesh screens on the intake structures will be installed for existing Unit No. 3 and the proposed Unit No. 4. Saltwater for the cooling system will be withdrawn from the existing intake canal and will be returned to the existing discharge canal. The plant cooling water flow will be pumped from the intake structure screen wells through the plant and discharged to the discharge canal where the flow from Unit No. 4 will combine with the existing flow from Units 1, 2 and 3. There is sufficient water available in Tampa Bay to supply the volume requirements of the Unit No. 4 once through cooling system. The fine mesh screens installed on the intake structures for existing Unit No. 3 and proposed Unit No. 4 will minimize the impact of entrainment and impingement on organisms in the area. A system will be provided to return organisms impinged on the fine mesh screen structures to a location suitable to the Department of Environmental Regulation and the United States Environmental Protection Agency.

(6) The cooling water passing through the plant will increase in temperature to an expected level of 17 degrees Fahrenheit above the temperature of the ambient intake cooling water prior to ultimate dishcharge. This 17 degree temperature rise is the design maximum for the unit at maximum load conditions. The heated water will be discharged to the existing station discharge canal and will then flow in a westerly direction into the Bay where it will mix with ambient water and continue to reduce in temperature.

(7) Tampa Electric Company performed a 316 Demonstration in accordance with Section 316 of the Clean Water Act of 1977, to assess the impacts of the thermal discharge from the plant on organisms in the Bay. In addition, the effects of the cooling water intake structure on impingement and entrainment of organisms in the intake water were assessed. These reports were submitted to the Department of Environmental Regulation and the Environmental Protection Agency for evaluation. The Department of Environmental Regulation has approved the use of a once through cooling system with fine mesh screens on the intake structures of Unit No. 3 and Unit No. 4. DER recommends establishment of a thermal mixing zone in accordance with Section 17-3.05, Florida Administrative Code, encompassing an area not to exceed 4980 acres. The conditions of certification proposed by DER require further validation of the size of the mixing zone after Unit No. 4 begins operations. The Environmental Protection Agency has tentatively determined that the use of fine mesh screen technology on existing Unit No. 3 and proposed Unit No. 4 constitutes the best technology available for minimizing adverse environmental impacts for the purposes of Section 316(b) of the Clean Water Act of 1977, and has also tentatively determined that the impact of the thermal discharge from proposed Unit No. 4 is within acceptable limits under Section 316(a) of the Clean Water Act of 1977.

(8) The unit will utilize chlorine in the circulating water system to control the growth of marine organisms in the condenser and intake tunnel. The control of this growth, or biofouling, is necessary to ensure that the flow of the cooling water and transfer of heat is not excessively impeded. The chlorine which is inserted into the circulating system is ultimately discharged to the discharge canal and then to the Bay.

To ensure compliance with Florida Class III water quality standards applicable to discharges of chlorine, the Department of Environmental Regulation recommends in its conditions of certification that an effluent limitation of 0.2 milligrams per liter be imposed and a mixing zone encompassing 6.1 acres be established.

(9) Process waste streams associated with Unit No. 4 will include the boiler blowdown, the bottom ash system blowdown and the flue gas desulfurization system blowdown. These three waste streams will be discharged to the circulating water system and ultimately to the discharge canal currently in existence. Waste streams which are not discharged to surface waters include the various plant drains and waste waters from various plant washing operations that will take place. These waste streams will be collected and transported to the existing waste water pond and, from there, the waste water will be recycled to the extent possible. Final disposal of this waste water will be through the existing stray irrigation system. The existing waste water pond and spray irrigation field are designed to accommodate the additional use. Runoff from the coal pile facility will be contained on the site and transported to the existing waste water pond.

(10) A drainage system is provided for the plant for the runoff from the materials storage areas, the byproduct storage areas, and the construction activity associated with the main structure at Big Bend Unit No. 4. Materials and byproduct storage area runoff will be intercepted and contained on site. Runoff from the Big Bend Unit No. 4 main construction area will be contained and pumped to the waste water pond. Other areas subject to construction will employ mitigative measures defined by the conditions of certification attached hereto.

(11) A potential concern exists that groundwater flow from the waste water treatment facilities and byproduct storage areas may result in leaching of pollutants into the groundwaters of the State. The groundwater at the existing site has been designated as Class I-B waters. The conditions of certification include a groundwater monitoring program designed to assess the ambient water quality and identify the potential impacts of leachate contamination with respect to the State groundwater quality standards.

(12) The impact to the existing water quality as a result of the discharge of the boiler blowdown, bottom ash blowdown and flue gas desulfurization system blowdown streams through the circulating water system to the discharge canal and ultimately to the Bay will be undetectable across the plant, from the point where the circulating water is taken into the plant, combined with the three streams and released at the point of discharge. There will be no measurable change in water quality as a result of these discharges.

(13) The flue gas desulfurization blowdown stream and the bottom ash blowdown stream will be subject to treatment to meet State and federal effluent limitations. The flue gas desulfurization system will be treated for pH adjustment, suspended solids removal and oil and grease removal prior to discha The bottom ash system will include an adequately sized pond to remove suspended solids so that the effluent limitations will be met. Boiler blowdown will not require treatment to meet applicable effluent limitations. In addition to the treatment method proposed above, Tampa Electric Company evaluated other options relating to the treatment of these streams to meet water quality standards for these discharges. Alternatives investigated includ a zero discharge option, further recycling of the waste streams

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various treatment methods to remove heavy metals prior to discharge. The cost of these alternatives ranges from $1.2 million to $1.8 million. Even with the treatment systems in place, there will be no detectable change in water quality from the point of intake to the point of discharge, after addition of the discharges from the three identified waste streams. Tampa Electric Company concluded that based upon these factors, and primarily upon the fact that even with additional treatment there will be no detectable change in water quality from the point of intake to the point of discharge, the expenditures are not justified in this circumstance.

(14) Tampa Electric Company requested variances from certain regulations of the Department of Environmental Regulation relating to ground and surface water quality standards. The request for variances from water quality standards for groundwater discharges contained in Rules 17-3.071 and 17-3.101(1),(3),(4), (8),(9) and (13), Florida Administrative Code, can be resolved by defining a zone of discharge and implementation of the groundwater monitoring program as outlined in the attached conditions of certification This variance request was therefore withdrawn by Tampa Electric Company at the hearing. The variance request from surface water quality standards contained in Rules 17-3.061(2)(a) (arsenic), 17-3.121(9) (cadmium), 17-3.061(2)(d)(chromium), 17-3.121(11) (copper), 17-3.121(16)(iron), 17-3.121(18)(mercury), 17-3.121(19) (nickel), and 17-3.121(26) (selenium), Florida Administrative Code, for the discharges of boiler blowdown, bottom ash blowdown and flue gas desulfurization system blowdown are recommended by the Department of Environmental Regulation to be granted for a period of two years after the start of commerical operation during which time TECO shall institute a study program, including monitoring, in accordance with the attached conditions of certification. The request for variances from surface water quality standards

contained in Rules 17-3.061(2)(h) and 17-3.121(7)(lead), 17-3.051 (minimum criteria) and 17-3.061(2) (general prohibition) Florida Administrative Code, were withdrawn by TECO at the hearing

(15) Tampa Electric Company also requested variances from the Hillsborough County Environmental Protection Commission rules relating to noise level standards and surface water quality standards. No representative of the Hillsborough County Environmental Protection Commission appeared at the hearing.

(16) A variance from the noise level standards contained in the Hillsborough County Environmental Protection Commission's Rule 1-10.04A is requested for the steam blowing operat that is necessary prior to commercial operation of proposed Unit No. 4. This procedure is recommended by the equipment manufactur to minimize damage to the steam turbine resulting from debris which may accumulate during construction of the unit. The noise levels produced from this steam venting operation vary from unit to unit and it is impossible to accurately predict what the noise levels will be. Violation of the provisions of the Commission's Rule 1-10.04A for short durations during the operation is possibl Tampa Electric Company will institute a notification procedure designed to inform residents in the area that the operation will occur over a short period of time. No adverse impact to residen and the environment in the affected area is anticipated and onl minor inconvenience to the residents is expected to occur. The entire operation occurs only intermittantly prior to initial sta up of the unit and should encompass a period not to exceed thirt (30) days from the start of the steam blowing operation.

(17) The surface water quality rules from which TEC seeks a variance from the Hillsborough County Environmental Protection Commission relate to the standards for chromium, lea iron and arsenic for the discharges of boiler blowdown, bottom ash blowdown and flue gas desulfurization system blowdown from

Unit No. 4. This variance request is made for the life of the certification for Unit No. 4. The evidence demonstrates that the three waste streams indentified above are discharged to the circulating water system and then to the discharge canal existing at the facility. The request for a variance from these pollutant parameters is based upon data compiled by the applicant and submitted to the Department of Environmental Regulation which shows that ambient water quality existing in Hillsborough Bay contains concentrations of the identified parameters (chromium, iron, and arsenic) in amounts which are already above applicable Hillsborough County Enviornmental Protection Commission surface water quality standards for Hillsborough Bay. The data concerning lead concentrations is inconclusive. The evidence demonstrates that with the exception of lead, the maximum values contained in the applicant's sampling data for chromium, iron, and arsenic are all above the applicable water quality standards.

(18) Access roads on the site which have been constructed for previous projects at the Big Bend Station are capable of assimilating additional traffic caused by the Unit No. 4 construction activities.

(19). There is very little opportunity for public access to the site during construction and operation. The vehicular traffic will be intercepted and controlled by a guard system at the entrance to the site on a 24-hour basis. In addition all other fenced areas will be equipped with locked gates and patrolled by roving guards.

(20) Except for intermittent traffic congestion, plant construction is not expected to have an impact on the nearest residential communities of Apollo Beach and Adamsville.

(21) There are no historic, scenic, cultural, or natural areas or state parks and recreation areas which will be disturbed by the construction of Big Bend Unit No. 4.

(22) The construction of Unit No. 4 and its related facilities will involve the loss of approximately 272 acres of vegetation and habitat on the eastern shore of Hillsborough Bay, some of which has been previously disturbed by construction activities associated with existing Units 1, 2 and 3. Sound levels predicted as a result of construction activities are below the maximum permissible sound levels in accordance with the Hillsborough County noise code limit of 60 dBA during the daytime in a residential area. The majority of construction will take place during daylight hours and no significant noise impact is expected at the surrounding residences from onsite constructio activities. Most bird and animal species located near the site are expected to have adjusted to the existing sound levels resulti from Units 1, 2 and 3 operation. Although birds and animals neare the plant may experience periodic "startle reaction" and move awa from the noise source, no measurable effects of construction nois levels on organisms occurring near or beyond the immediate site location are anticipated. The area wide effect of construction and operation on wildlife and vegetation is not expected to be significant. Appropriate steps have been proposed to minimize the environmental impact of construction and operation of Unit No. 4.

(23) The Florida Public Service Commission has determined that there is a need in the State of Florida for the electr power to be produced by proposed Big Bend Unit No. 4.

(24) The Tampa Bay Regional Planning Council has generally concluded that there are no over-riding objections to the proposal for Unit No. 4 so long as adequate steps are taken to mitigate problems associated with air and water pollution.

(25) The Hillsborough County City-County Planning Commission has commented on the project and offered no objection to it.

(26) The Division of Archives, History and Records Management concluded that the proposed coal fired power plant is unlikely to affect any archeological or historical sites.

(27) The National Marine Fisheries Service has made several recommendations regarding once through cooling concerns including the use of fine mesh screens, but does not object to the overall project. The United States Fish and Wildlife Service expressed concerns similar to those of the National Marine Fisheries Service and also does not object to the overall project.

(28) The Department of Veteran and Community Affai has concluded that the application is generally compatible with the State Comprehensive Plan.

(29) The Department of Environmental Regulation ha made no recommendation concerning the grant or denial of the variance requests from Hillsborough County Environmental Protect Commission Rules.

(30) The Department of Environmental Regulation, the Department of Veteran and Community Affairs and the Southwe Florida Water Management District have all recommended certific of the proposed Big Bend Unit No. 4 subject to the stipulated ditions of certification which are attached to this Recommende Order.

(31) At the conclusion of the site certification hearing, members of the general public were given the opportun to comment upon the application for site certification. No public testimony was offered.

CONCLUSIONS OF LAW

This proceeding was conducted pursuant to the "Fl Electrical Power Plant Siting Act," Chapter 403, Part II, Flo Statutes, and Chapter 17-17, Florida Administrative Code, to sider Tampa Electric Company's application for site certifica of proposed Big Bend Unit No. 4. In accordance with Chapters and 120, Florida Statutes, and Chapter 17-17, Florida Administrative Code, notice was given to all persons and parties entitl thereto, as well as to the general public.

The purpose of the site certification hearing was to receive testimony and evidence concerning whether the location and operation of the proposed facilities will produce minimal adverse effects on human health, the environment, the ecology of the land and its wildlife, and the ecology of State waters and their aquatic life in an effort to fully balance the increas demand for electric power plant location and operation with the broad interests of the public. Section 403.502, Florida Statute

The record of this proceeding establishes that all the necessary and required governmental agencies were parties to this proceeding and that all required reports and studies were completed and presented to the Department of Environmental Regulation. These include the report of the Department of Vete and Community Affairs as to the compatibility of the proposed electrical power plant with the State Comprehensive Plan (§403. (a), Fla. Stats.), the Florida Public Service Commission's repo as to the present and future need for the electrical generating capacity to be supplied by the proposed plant (§403.507(1)(b), Fla. Stats.), and the report of the Southwest Florida Water Management District as to its position on the impact of the proposed facility on water resources (Rule 17-17.04(5), Fla. Admin. The record further establishes that the Department of Environme Regulation conducted or contracted for the enumerated studies required by Section 403.507(2), Florida Statutes, and complete its report and recommendations with respect thereto. The Depar ment of Environmental Regulation recommends certification of proposed Big Bend Unit No. 4 subject to the attached condition of certification which have been accepted by the applicant Tamp Electric Company.

The oral and documentary evidence adduced at the hearing demonstrate that the operational safeguards for the proposed Unit No. 4 are technically sufficient for the welfare and protection of the citizens of Florida. If performed in accordance with the attached conditions of certification, the construction, operation and location of the proposed new unit are expected to produce minimal adverse effects on human health, the environment, the ecology of the land and its wildlife and the ecology of State waters and their aquatic life. Certification is consonant with the premise of abundant, low-cost electrical energy. If certified pursuant to the attached conditions, proposed Big Bend Unit No. 4 will comply with pertinent State and federal regulations concerning ambient air quality, the prevention of significant deterioration of air quality and the application of the "best available control technology."

The applicant's request for a variance from the DER's surface water quality standards for discharges of boiler blowdown, bottom ash blowdown and flue gas desulfurization system blowdown, if carried out in accordance with page 23 of the attached conditions of certification, is supported by the evidence adduced at the hearing. This variance request should be granted for a period of two years.

In order to minimize damage to the proposed unit's steam turbine, it is necessary that TECO perform an operation kno as steam blowing or steam venting. This operation may result in a violation of the noise level standards of the Hillsborough County Environmental Protection Commission. The operation occurs only intermittantly over a thirty (30) day period prior to the initial startup of Big Bend Unit No. 4. Provided that TECO agree to engage in a prior public notification program to notify residents in the area of the steam blowing operation, TECO should be granted a variance from the Commission's noise level standards (Rule 1-10.04A) for a period not to exceed thirty (30) days from the commencement of the steam blowing operations.

There being no opposition to the variance request from the surface water quality standards of the Hillsborough County Environmental Protection Commission, and the request being otherwise supported by the evidence adduced by the applicant (with the exception of the lead parameter), this variance request relating to general, chromium, iron and arsenic standards should be granted for the life of the certification. The requested variance from the lead standard should be denied since the evidence failed to demonstrate that variance relief is necessary for that parameter.

RECOMMENDATION

Based upon the entire record of this proceeding and the above findings of fact and conclusions of law,

IT IS RECOMMENDED THAT:

(1) Tampa Electric Company be granted certification pursuant to Chapter 403, Part II, Florida Statutes, for the location, construction and operation of Big Bend Unit No. 4, the associated facilities and the directly associated transmissi line, as proposed in the amended application and evidence in the record;

(2) The certification be subject to the conditions of certification attached to this Recommended Order as Appendix

(3) The variance request from the Department of Environmental Regulation's surface water quality standards be granted in accordance with the conditions of certification whic are attached hereto;

(4) The variance request from Hillsborough County Environmental Protection Commission Rule 1-10.04A governing noise requirements be granted for a period not to exceed thirty (30) days from the commencement of steam blowing operations, conditioned upon Tampa Electric Company's agreement to notify the affected members of the public prior to the steam blowing operation;

(5) The variance request from Hillsborough County Environmental Protection Commission surface water quality standards contained in Rules 1-5.04, 2. (general), 1-5.04, 2.n (chromium), 1-5.04, 2.q (iron), and 1-5.04, 2.r (arsenic) be granted for the life of the certification for Big Bend Unit No. 4; and

(6) The variance request from Hillsborough County Environmental Protection Commission surface water quality standards pertaining to lead, Rule 1-5.04, 2.p., be denied.

Respectfully submitted and entered this 21st day of July, 1981, in Tallahassee, Florida.

Diane D. Tremor
DIANE D. TREMOR
Hearing Officer
Division of Administrative Hearings
The Oakland Building
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APPENDIX I

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State of Florida Department of Environmental Regulation
Tampa Electric Company
Big Bend Unit 4
PA 79-12

CONDITIONS OF CERTIFICATION (Revised 6-2-81)

I. Air

The construction and operation of Big Bend Unit 4 at the Tampa steam electric power plant site shall be in accordance with all applicable provisions of Chapters 17-2, 17-4, 17-5 and 17-7, Florida Administrative Code. In addition to the foregoing, the permittee shall comply with the following conditions of certification:

A. Emission Limitations

1. Based on a maximum heat input of 4.330 million BTU per hour, stack emissions from Big Bend Unit 4 shall not exceed the following when burning coal:

    a. SO_2 - 1.2 lb. per million BTU heat input, maximum two hour average. 0.84 lb/MMBtu on a 30-day rolling average.

    b. NO_x - 0.60 lb. per million BTU heat input.

    c. Particulates - 0.03 lb. per million BTU heat input.

    d. Visible emissions - 20 (6-minute average), except one 6-minute period per hour of not more than 27 opacity.

2. The height of the boiler exhaust stack for Unit 4 shall not be less than 490 ft. above grade.

3. Particulate emissions from the coal handling facilities:

    a. The permittee shall not cause to be discharged into the atmosphere from any coal processing or conveying equipment, coal storage system or coal transfer and loading system processing coal, visible emissions which exceed 20 percent opacity. Particulate emissions shall be controlled by use of control devices.

    b. The permittee must submit to the Department within ten (10) working days after it becomes available, copies of technical data pertaining to the selected particulate emissions control for the coal handling facility. These data should include, but not be limited to, guaranteed efficiency and emission rates, and major design parameters such as air/cloth ratio and flow rate. The Department may, upon review of these data, disapprove the use of such device if the Department determines the selected control device to be inadequate to meet the emission limits specified in 3(a) above. Such disapproval shall be issued within 30 days of receipt of the technical data.

4. Particulate emissions from limestone and flyash handling shall not exceed the following:

   a. Limestone silos - 0.05 lb/hr.

   b. Limestone hopper/transfer conveyors - 0.65 lb/hr.

   c. Flyash handling system - 0.2 lb/hr.

5. Visible emissions from the following facilities shall be limited to 5% opacity: (a) limestone and flyash handling system, (b) limestone day silos and (c) flyash silos.

6. Compliance with opacity limits of the facilities listed in Condition 5 will be determined by EPA reference method 9 (Appendix A, 40 CFR 60).

7. Construction shall reasonably conform to the plans and schedule given in the application.

8. The permittee shall report any delays in construction and completion of the project to the Department's Southwest District Office.

9. Reasonable precautions to prevent fugitive particulate emissions during construction, such as coating of roads and construction sites used by contractors, will be taken by the permittee.

10. Coal should not be burned in the unit unless both electrostatic precipitator and limestone scrubber are operating properly.

11. Coal burned in the unit should be washed before it is transported to the plant site.

C. Air Monitoring Program

1. The permittee shall install and operate continuously monitoring devices for the Unit 4 boiler exhausts for sulfur dioxide, nitrogen dioxide, oxygen and opacity. The monitoring devices shall meet the applicable requirements of Section 17-2.08, FAC, and 40 CFR 60.47a. The opacity monitor may be placed in the duct work between the electrostatic precipitator and the FGD scrubber.

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2. The permittee or Hillsborough county shall operate the two ambient monitoring devices for sulfur dioxide in accordance with EPA reference methods in 40 CFR, Part 53, and two ambient monitoring devices for suspended particulates. The monitoring devices shall be specifically located at a location approved by the Department. The frequency of operation shall be every six days commencing as specified by the Department.

3. The permittee shall maintain a daily log of the amounts and types of fuels used and copies of fuel analyses containing information on sulfur content, ash content and heating values.

4. The permittee shall provide sampling ports into the stack and shall provide access to the sampling ports, in accordance with DER publication, Standard Sampling Techniques and Methods of Analysis for the Determination of Air Pollutants from Point Source, July, 1975.

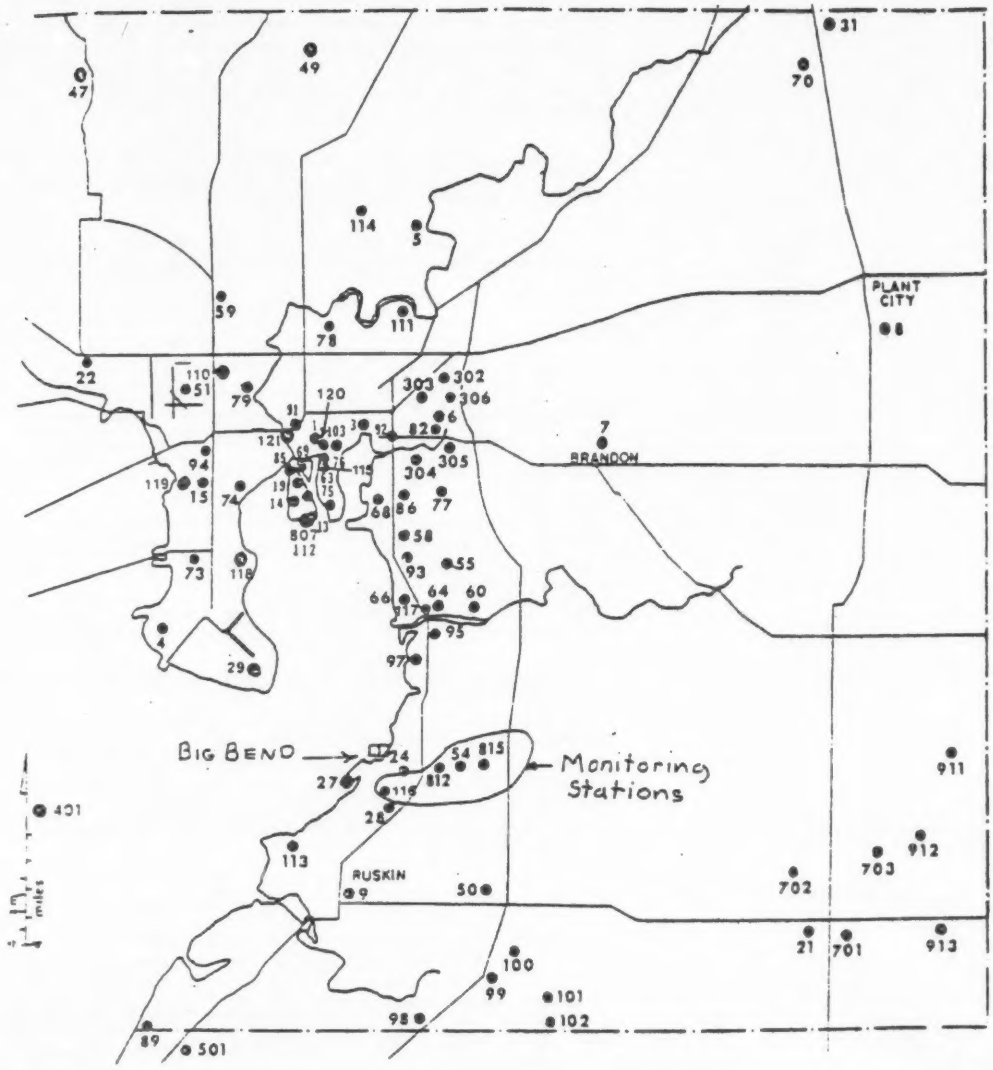
5. The ambient monitoring program may be reviewed by the Department and the permittee annually beginning two years after start-up of Unit 4.

6. Prior to operation of the source, the permittee shall submit to the Department a standardized plan or procedure that will allow the permittee to monitor emission control equipment efficiency and enable the permittee to return malfunctioning equipment to proper operation as expeditiously as possible.

C. Stack Testing:

1. Within 60 calendar days after achieving the maximum capacity at which each unit will be operated, but no later than 180 operating days after initial start-up, the permittee shall conduct performance tests for particulates SO_2, NO_x and visible emissions during normal operations near 4,330 MMBtu/hr heat input and furnish the Department a written report of the results of such performance tests within 30 days. The performance tests will be conducted in accordance with the provisions of 40 CFR 60.46a, 48a, and 49a.

2. Performance tests shall be conducted and data reduced in accordance with methods and procedures in accordance with DER's Standard Sampling Techniques and Methods of Analysis for Determination on Air Pollutants from Point Sources, July, 1975.


PLANT CITY
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RUSKIN
BIG BEND
Monitoring Stations
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AIR SAMPLING STATIONS
HILLSBOROUGH COUNTY, FLORIDA
1979

Figure 1

3. Performance tests shall be conducted under such conditions as the Department shall specify based on representative performance of the facility. The permittee shall make available to the Department such records as may be necessary to determine the conditions of the performance tests.

4. The permittee shall provide 30 days prior notice of the performance tests to afford the Department the opportunity to have an observer present.

5. Stack tests for particulates and SO_2 shall be performed annually in accordance with conditions C. 2, 3, and 4 above.

D. Reporting

1. For Unit 4, stack monitoring, fuel usage and fuel analysis data shall be reported to the Department's Southwest District Office on a quarterly basis commencing with the start of commercial operation in accordance with 40 CFR, Part 60, Section 60.7., and in accordance with Section 17-2.08, FAC.

2. Utilizing the SAROAD or other format approved in writing by the Department, ambient air monitoring data shall be reported to the Bureau of Air Quality Management of the Department quarterly. Commencing on the date of certification, such reports shall be due by the last day of the month following the quarterly reporting period.

3. Beginning one month after certification, the permittee shall submit to the Department a quarterly status report briefly outlining progress made on engineering design and purchase of major pieces of equipment (including control equipment). All reports and information required to be submitted under this condition shall be submitted to the Administrator of Power Plant Siting, Department of Environmental Regulation, 2600 Blair Stone Road, Tallahassee, Florida, 32301.

II. Water Discharges

Any discharges into any waters of the State during construction and operation of Big Bend Unit 4 shall be in accordance with all applicable provisions of Chapter 17-3, Florida Administrative Code, and 40 CFR, 423, Effluent Guidelines and Standards for Steam Electric Power Generating Point Source Category, except as provided herein. Also, the permittee shall comply with the following conditions of certification:

A. Plant Effluents and Receiving Body of Water

For discharges made from the power plant the following conditions shall apply:

1. Receiving Body of Water (RBW)

The receiving body of water has been determined by the Department to be those waters of the Tampa Bay and any other waters affected which are considered to be waters of the State within the definition of Chapter 403, Florida Statutes.

2. Point of Discharge (P.O.D.)

The point of discharge will be determined by the Department to be where the effluent physically enters the waters of the State.

3. Thermal Mixing Zone

The instantaneous zone of thermal mixing for the cooling system shall not exceed an area of 4980 acres. The temperature at the point of discharge into the Tampa Bay shall not be greater than 109 degrees F. The temperature of the water at the edge of the mixing zone shall not exceed the limitations of Paragraph 17-3.05(1)(d). The permittee shall validate the size of this mixing zone by submission of a verified or calibrated thermal dispersion model at least six months prior to commencement of operation. The Department and TECO shall agree to a program for selecting, verifying and utilizing an appropriate model.

4. Chemical Wastes

All discharges of low volume wastes (demineralizer regeneration, floor drainage, lab drains and similar wastes) shall comply with Chapter 17-3. If violations of Chapter 17-3 occur, corrective action shall be taken. These wastewaters shall be discharged to an adequately sized and constructed treatment facility. Preoperational and operational metal cleaning wastes, low volume wastes, boiler fireside wash, air preheater wash, and stack wash shall be disposed of in an adequately sized percolation pond and spray irrigation facility.

5. Coal Pile

Coal pile runoff shall be disposed of in the wastewater treatment/spray irrigation system and shall not be directly discharged to surface waters.

6. Chlorine

The concentration of total residual chlorine discharged from Unit 4 shall not exceed 0.2 mg/l at the POD

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nor 0.01 mg/l beyond an instantaneous mixing zone of 6.1 acres. The condensers for Unit 4 shall not be chlorinated more than two hours per day and shall not be chlorinated simultaneously with any other unit.

7. pH

The pH of the combined discharges shall be such that the pH be within the range of 6.0 to 8.5.

8. Polychlorinated Biphenyl Compounds

There shall be no net discharge of polychlorinated biphenyl compounds.

9. FGD Chloride Bleedstream

The bleedstream from the FGD system shall be treated to control pH, turbidity, solids and toxic metals prior to discharge into the cooling water system. The following effluent limitations will apply:

Effluent	Daily Maximum	Maximum 30-Day Daily Average
TSS	100 mg/l	30 mg/l
Oil and Grease	20 mg/l	15 mg/l
pH	6-9	6-9

The design plans and specifications of the treatment system shall be submitted to the Department for review and approval prior to construction.

10. Boiler and Bottom Ash Sluice System Blowdown

Blowdown from the boiler and from the bottom ash sluice system shall be treated as appropriate prior to discharge to the cooling water system. The following effluent limitations shall apply:

Effluent	Daily Maximum	Maximum 30-Day Daily Average
TSS	100 mg/l	30 mg/l
Oil and Grease	20 mg/l	15 mg/l
pH	6-9	

TECO shall provide the dimensions of the bottom ash system settling pond and provide calculations demonstrating that sufficient residence time will be provided to achieve the above limitations.

11. Gypsum Storage Areas

There shall be no direct discharge of stormwater runoff to surface waters from the gypsum storage area.

12. Storm Water Runoff

During plant operation, necessary measures shall be used to settle, filter, treat or absorb silt-containing or pollutant-laden stormwater runoff to limit the suspended solids to 50 mg/l or less at the POD during rainfall periods less than the 10-year, 24-hour rainfall, and to prevent an increase in turbidity of more than 50 Jackson Turbidity Units above background in waters of the State beyond 150 meters from the POD at Station E 4500 and N 3712.

Control measures shall consist at the minimum of filters, sediment traps, barriers, berms or vegetative planting. Exposed or disturbed soil shall be protected as soon as possible to minimize silt - and sediment-laden runoff. The pH shall be kept within the range of 6.0 to 8.5 at the POD.

13. Percolation Pond Overflow

There shall be no discharge from the wastewater treatment system percolation pond except during emergency conditions caused by severe weather. Any discharge from the existing overflow pipe shall be reported to the Department and the Environmental Protection Agency. All discharges from this overflow system shall be monitored for pH, TSS, oil and grease, and the metals listed in condition II, B.1.; the flow and duration of flow shall be estimated.

B. Water Monitoring Programs

The permittee shall monitor and report to the Department the listed parameters on the basis specified herein. The methods and procedures utilized shall receive written approval by the Department. The monitoring program may be reviewed annually by the Department, and a determination may be made as to the necessity and extent of continuation, and may be modified in accordance with Condition No. XXV.

1. Chemical Monitoring

The following parameters shall be monitored during discharge as shown, discharge commencing with the start of commercial operation of Unit 4 and reported quarterly to the Departments Southwest District Office:

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Parameter	Location	Sample Type	Frequency
Flow, Cooling	Intake	Pump Log	Continuous
Flow, Bottom Ash	Prior to CWS	Recorder	Continuous
Flow, Boiler Blowdown	Prior to CWS	Daily Log	Daily
Flow, FGD Bleed	Prior to CWS	Recorder	Continuous
pH	CWS and prior to CWS on FGD Bleed Boiler & Bottom Ash Blowdown	Grab "	Two per Week
Temperature	CWS Outfall	Recorder	Continuous
TSS	Bottom Ash Blowdown, FGD Bleed, & Boiler Blowdown	Grab	Two per Week Two per Month
Chlorine, Total Residual	Outfall	Multiple Grab	Weekly
Oil and Grease	Boiler Blowdown Bottom Ash Blowdown and FGD bleed	Grab	Two per Month
Metals	Intake, Outfall, FGD Bleed Stream Bottom Ash Blowdown & Boiler Blowdown Prior to discharge to CWS	Two-Grab composite, not less than two hours between samples	Two per Month for the first year, then monthly thereafter
Arsenic	"		"
Cadmium	"		"
Iron	"		"
Lead	"		"
Mercury	"		"
Selenium	"		"
Zinc	"		"
Copper	"		"
Chromium	"		"
Nickel	"		"

C. Biological Monitoring

1. Thermal Studies

Sampling shall be done on a bi-monthly basis commencing one month after certification and shall continue for a period of one year after Unit 4 is on-line. Such sampling shall consist of a baseline survey and an intensive survey. Sampling methodology shall be the same as that in the 1979 aquatic biology studies. Deviations from that methodology shall be approved by the DER.

All raw data shall be available upon request by DER. At the end of the first year of post-operational study, the Department shall review all of the data in the form of an annual report and shall determine if

*CWS - Cooling Water System

Revised 6/2/81

mitigative action must be taken by TECO and shall determine if the impacts of the thermal discharge are in compliance with the requirements of Section 17-3.05(1)(f) and if the thermal mixing zone granted by Condition II.A.3 is appropriate. If the data are sufficient to convince the Department that severe thermal effects have been confined to an acceptably limited area, the monitoring studies shall be terminated. If not, the studies shall be continued until such time as the thermal impact can be thoroughly evaluated.

(1) Baseline Survey

In order to put the 1979 benthic study in proper ecological perspective regarding the regular cyclical biotic fluctuations which are known to occur in Tampa Bay, the following program shall be implemented:

i. Benthic macroinvertebrate sampling shall be carried out on a bi-monthly basis one month after the time of enactment of certification until a period of 12 months prior to commencement of operation of Unit 4. Five stations corresponding to stations 5, 6, 8, 11, and 12 of the 1979 Benthic Ecology Study* shall be sampled according to the methods outlined in the TECo benthic report. Deviations from that methodology shall be approved by the DER.

ii. Water quality parameters shall be monitored during the benthic sampling program on a bi-monthly basis at each of the above stations. Parameters to be examined shall include salinity, dissolved oxygen, turbidity, and water temperature (top and bottom).

iii. A sediment analysis shall be carried out at each of these stations on a bi-monthly basis corresponding to the benthic sampling according to the methods outlined in the 1979 Benthic Study. If sediment samples show little bi-monthly variability, TECo may request a less rigorous sampling frequency.

(2) Intensive Survey

In order to adequately assess the thermal impact of Big Bend Unit 4 in conjunction with the combined plume discharge from units 1, 2, and 3, the following biological monitoring program shall be implemented one year before and shall continue for one year after commencement of operation of Unit 4. A proposal for these intensive studies shall be prepared by the applicant and shall be submitted to DER for approval at least 18 months prior to commercial operation of Unit 4. Such a proposal shall reflect the methodologies employed during the 1979 study so that both data sets can be compared for evaluation of thermal impact from Unit 4.

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*"A Study of Thermal Effects on Benthic Communities of Big Bend, Tampa Bay (Florida)", July 1980. TECO

Revised 6/2/81

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i. The applicant shall collect bi-monthly benthic, samples. The stations to be chosen for the Benthic sampling program shall be taken from the 1979 Benthic Ecology Study plus three additional stations. These three stations shall be located on a transect running into the bay from station 8, paralleling stations 5, 6, and 7 of the 1979 study. Water quality parameters and sediment samples shall be collected and analyzed as in the baseline survey.

ii. Stations 1 and 2 shall be deleted from the proposed studies.

iii. Trammel (or gill net) and trawl samples shall be taken each month during the day and at night in the vicinity of the embayment--Apollo Beach pass. If possible, night sampling shall be during a flood tide. Additionally, monthly seine samples shall be collected in the area during the day.

b. Entrainment

1. In order to evaluate the entrainment mortality at the Big Bend Station, TECO shall conduct a Fine Mesh Screen Survivability Study (similar to the 1980 Prototype FMS study) for one full spawning period (March through September). Sampling for the study will be conducted at three locations pertaining to Unit 4:

Station 1: Front of screen after organisms are impinged and washed to the screen return system.

Station 2: Behind the screen.

Station 3: At the discharge point in the Organism Return Canal (ORC).

Stations 1 and 2 will be sampled simultaneously to estimate the total number of organisms entrained at the plant. Initial and latent mortality tests will be conducted on organisms collected at stations 1 and 2 only. A detailed scope of study shall be submitted by TECO at least twelve months prior to the commencement of commercial operation of Unit 4.

III. Water Use

A. Use of Water

TECO shall use the lowest quality water which it has the ability to use. To the extent that a dependable supply of non-potable water can be provided, TECO shall use the non-potable water in lieu of the potable water from the public

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water supply system of Hillsborough County. However, if TECO can demonstrate that non-potable water is not available due to technical or environmental reasons, then the use of potable water may be authorized by the Secretary upon the concurrence of the Southwest Florida Water Management District (SWFWMD).

B. Consumptive Use of Groundwater

1. In the event that fresh groundwater in excess of quantities permitted by SWFWMD should be required for the operation of Big Bend Unit 4, TECO shall demonstrate to the satisfaction of the SWFWMD that such a consumptive use of groundwater will be in compliance with the regulations and policies of the District and will have no significant adverse effect on regional water supplies.

2. In the event that use of brackish groundwater should become necessary, an intensive investigation and aquifer testing program shall be performed by TECO. The aquifer

testing program shall be submitted to the Department and the Director, Regulatory Division of SWFWMD, and approved prior to commencement of the investigation. The investigation should include but need not be limited to the following:

a. The geology encountered while drilling the well, with emphasis placed on the depth, thickness and hydraulic characteristics of formations encountered.

b. The aquifer systems that are encountered, along with the discussion on water quality and availability.

c. Performance of a pump test, description of aquifer characteristics and evaluation procedure.

d. Interpretation of geophysical logs.

e. Discussion of aquifer recharge and ultimate source.

Upon completion of the investigations, TECO shall submit a report on the feasibility of utilizing brackish groundwater for cooling tower make-up, and at that time the SWFWMD may authorize withdrawals. If SWFWMD should authorize withdrawals of brackish water, TECO shall submit monthly pumpage reports and chlorides, sulfate and TDS analysis on the production well to the SWFWMD.

C. Emergency Shortages

In the event an emergency water shortage should be declared pursuant to Section 373.175 or 373.246, F.S., by Southwest Florida Water Management District for an area including Hillsborough County, the Department pursuant to Section 403.516, F.S., may alter, modify, or declare to be inactive all or parts of Condition III.A.-E. An authorized SWFWMD representative at any reasonable time may enter the property to inspect the facilities.

D. Monitoring and Reporting

Tampa Electric Company shall implement the following groundwater monitoring program:

1. The groundwater levels shall be monitored at wells as approved by DER and the Southwest Water Management District. Chemical analyses shall be made on samples from all monitored wells identified in this Condition. The location, frequency, water levels and selected chemical analyses shall be as given in Condition III.D.3.

2. The groundwater monitoring program shall be implemented at least one year prior to operation of Big Bend Unit 4. The chemical analyses shall be in accord with the latest edition of Standard Methods for the Analysis of Water and Wastewater. The data shall be submitted within 30 days of collection/analysis to the Southwest Florida Water Management District and to the DER Power Plant Siting Section.

3. After consultation with the DER and SWFWMD, TECO shall install a monitoring well system, as generally shown on Figure 3, to monitor groundwater quality in the top 40 feet of the surficial aquifer. One well shall be installed to a depth greater than 40 feet but less than 100 to monitor vertical dispersion or groundwater contaminants. Monitoring well locations and designs shall be submitted to the Department and SWFWMD for review. Approval or disapproval of the locations and design shall be granted within 60 days. The water samples collected from each of the monitor wells shall be collected immediately after removal by pumping of a quantity of water equal to two casing volumes. The water quality analyses shall be performed monthly during the year prior to commercial operation and for two years after operation and quarterly thereafter. Results shall be submitted to the Department and the SWFWMD by the fifteenth (15th) day of the month following the month during which such analyses were performed. Testing for the following constituents is required:

   Conductance
   pH
   Chloride
   Iron
   Cadmium
   Zinc
   Copper
   Sulfate
   Silver
   Nickel
   Selenium
   Chromium
   Arsenic
   Beryllium
   Mercury
   Lead
   Gross Alpha
   Barium

4. After the second year of monitoring and periodically thereafter, the Department and the permittee shall review the results of the monitoring program and determine the necessity for modifying or continuing the program.

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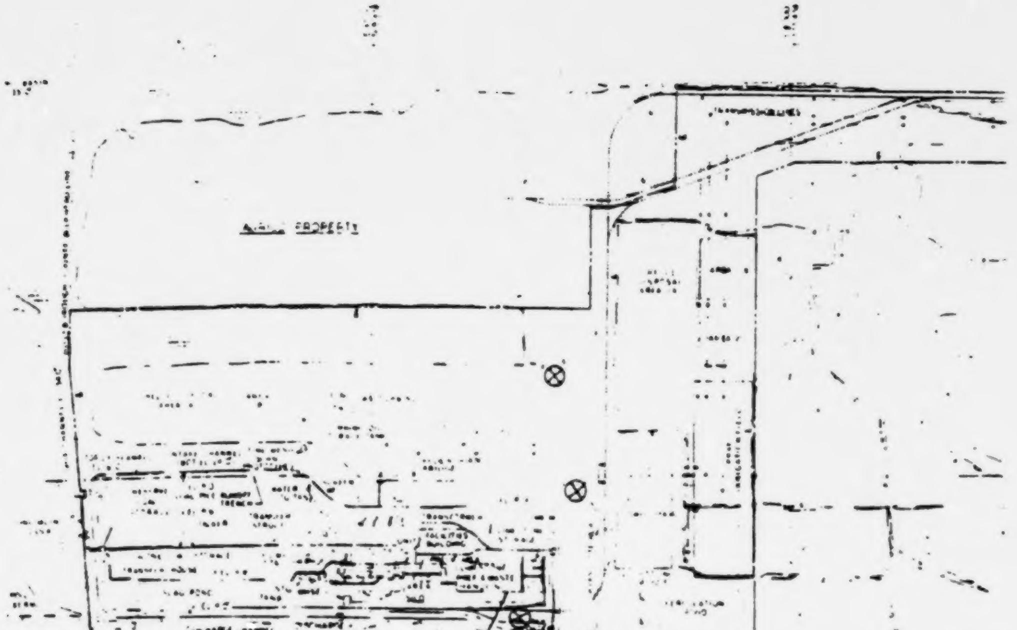
PROPERTY
40
50
60

Monitoring Well--- ⊗

FIGURE 3

E. Leachate

1. Zone of Discharge

Leachate from the FGD/gypsum landfill, coal storage pile, bottom ash pond, wastewater treatment ponds, ash disposal cells, and spray irrigation field shall not contaminate waters of the State (including both surface and groundwaters) in excess of the limitations of Chapter 17-3, FAC., beyond the boundary of the site.

2. Corrective Action

When the groundwater monitoring system shows a violation of the groundwater water quality standards of Chapter 17-3, FAC., the appropriate ponds, FGD landfill, or coal pile shall be sealed, relocated or closed, or the operation of the affected facility shall be altered in such a manner as to assure the Department that no violation of the groundwater standards will occur beyond the boundary of the site.

IV. Control Measures During Construction

A. Stormwater Runoff

During construction, necessary measures shall be used to settle, filter, treat or absorb silt-containing or pollutant-laden stormwater runoff to limit the suspended solids to 50 mg/l or less at the POD during rainfall periods less than the 10-year, 24-hour rainfall, and to prevent an increase in turbidity of more than 50 Jackson Turbidity Units above background in waters of the State beyond 150 meters from the POD.

Control measures shall consist at the minimum of filters, sediment traps, barriers, berms or vegetative planting. Exposed or disturbed soil shall be protected as soon as possible to minimize silt- and sediment laden runoff. The pH shall be kept within the range of 6.0 to 8.5 at the POD.

B. Sanitary Wastes

Disposal of sanitary wastes from construction toilet facilities shall be in accordance with applicable regulations of the Department and appropriate local health agency. The sewage treatment plant shall be operated in accordance with Chapters 17-3, 17-6, 17-16, and 17-19, FAC.

C. Environmental Control Program

An environmental control program shall be established under the supervision of a qualified person to assure that all construction activities conform to good environmental practices and the applicable conditions of certification.

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The permittee shall notify the Department by telephone if unexpected harmful effects or evidence of irreversible environmental damage are detected during construction, shall immediately report in writing to the Department and shall within two weeks provide an analyses of the problem and a plan to eliminate or significantly reduce the harmful effects or damage and a plan to prevent reoccurrence.'

D. Discharge of Construction Dewatering Effluent

Construction dewatering effluent shall be treated as appropriate to limit suspended solids to no more than 50 mg/l. The discharge of construction dewatering liquids shall not cause turbidity in excess of 50 Jackson Turbidity Units above ambient beyond a 20 meter radius from the point of discharge. Weekly grab samples will be collected and analyzed for suspended solids.

V. Solid Wastes

Solid wastes resulting from construction or operation shall be disposed of in accordance with the applicable regulations of Chapter 17-7, FAC. The permittee shall submit a program for approval outlining the methods to be used in handling and disposal of solid wastes. Such program shall indicate at the least methods for erosion control, covering, vegetation and quality control.

Open burning in connection with land clearing shall be in accordance with Chapter 17-5, FAC. No additional permits shall be required, but the Division of Forestry shall be notified prior to burning. Open burning shall not occur if the Division of Forestry has issued a ban on burning due to fire hazard conditions.

VI. Operation Safeguards

The overall design, layout, and operation of the facilities shall be such as to minimize hazards to humans and the environment. Security control measures shall be utilized to prevent exposure of the public to hazardous conditions. The Federal Occupational Safety and Health Standards will be complied with during construction and operation. The Safety Standards specified under Section 440.56, F.S., by the Industrial Safety Section of the Florida Department of Commerce will also be complied with.

VII. Screening

The permittee shall provide screening of the site through the use of aesthetically acceptable structures, vegetated earthen walls and/or existing or planted vegetation in accordance with Hillsborough County ordinances.

VIII. Potable Water Supply System

The potable water supply system shall be designed and operated in conformance with Chapter 17-22, FAC. Information as required in 17-22.108 shall be submitted to the Department prior to construction and operation. The operator of the potable water supply system shall be certified in accordance with Chapter 17-16, FAC.

IX. Transformer and Electric Switching Gear

The foundations for transformers, capacitors, and switching gear necessary to connect Big Bend Unit 4 to the existing distribution system shall be constructed of an impervious material and shall be constructed in such a manner as to allow complete collection and recovery of any spills or leakage of oily, toxic, or hazardous substances.

X. Toxic, Deleterious, or Hazardous Materials

The spill of any toxic, deleterious, or hazardous materials shall be reported in the manner specified by Condition XV.

XI. Construction in Waters of the State

A. Intake and Discharge

1. No construction on sovereignty submerged lands shall commence without obtaining lease or title from the Department of Natural Resources.

2. Construction of intake and discharge structures should be done in a manner to minimize turbidity. Turbidity screens should be used to prevent turbidity in excess of 50 JTUs above background beyond 150 meters from the dredging, pile driving, or construction site.

3. The construction methodology for the intake structure and screens shall be provided to the Department's Southwest District Office for review prior to construction.

4. All spoil shall be piped hydraulically or trucked to an upland disposal site of sufficient capacity to retain all material.

5. Effective stabilization of submerged bottom sediments at the Cooling Water System discharge should be achieved and maintained during the period of operation by the placement of concrete, riprap or other suitable material.

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B. Relocation of Jackson Branch

1. An equivalent square footage of mangroves will be replanted in the new creek cut.

2. The new creek will have 6:1 side slopes from +1' MSL to -1' MSL.

3. *Juncus* sp. are to be planted at three foot intervals for the entire length of the relocated segment of the branch according to sound management practices.

4. The 90° turn in the creek should be stabilized by riprap as well as the planting of a higher concentration of *Juncus* sp. on the outside of the turn.

5. The relocated cut is to be excavated and stabilized behind an upstream plug before being connected to the existing creek; conversely, the existing branch shall not be taken off line until the new cut is stabilized and JTUs are less than 25 in the new channel.

6. Permittee should submit to the Southwest District Office a replanting proposal at least 60 days prior to commencement of construction, including species, methods and placement details.

7. Permittee will monitor the outfall of Jackson Branch twice daily during construction for turbidity in JTUs and report these results weekly to the Southwest District Office.

C. Newman Branch

1. In the construction of the FGD/gypsum disposal areas, TECO shall not alter the ditch along the east side of Beach Road, as that ditch is tidally connected to Newman Branch.

2. To mitigate against the loss of the grass pond in the area designated as Phase I of the FGD/gypsum disposal area, TECO shall reconstruct the northernmost east-west drainage canal. The side slopes of this drainage canal on the TECO property shall be reduced to at least 6:1 (horizontal to vertical) and planted with *Juncus effusus*. Such reconstruction shall be done in a manner to prevent violation of Section 17-3.121, F.A.C, Water Quality Criteria. Plans for canal reconstruction shall be submitted to the Department for approval sixty days prior to reconstruction of the canal.

XII. FGD/Gypsum Landfill

The proposed FGD/gypsum landfill area shall be monitored and studied pursuant to a detailed groundwater testing and monitoring program as defined in Condition III D.

The results of the program will be used by the Department in determining whether TECO has affirmatively demonstrated that Florida Water Quality Criteria (Chapter 17-3, F.A.C) will not be violated.

If the Department determines that TECo has failed to affirmatively demonstrate that Florida Water Quality Criteria (Chapter 17-3, F.A.C) will not be violated, TECo shall within 90 days of such determination present to the Department a plan of correction (which may include, if appropriate, an impermeable liner) for review and approval by the Department and for timely implementation by TECO.

Construction of perimeter berms shall be in conformance with the provisions of Chapter 17-9, FAC, regarding earthen dams.

XIII. Transmission Lines

Directly associated transmission lines shall be constructed and maintained in order to minimize environmental impacts in accordance with Chapter 403, F.S.

XIV. Change in Discharge

All discharges or emission authorized herein shall be consistent with the terms and conditions of this certification. The discharge any pollutant not identified in the application or any discharge more frequent than, or at a level in excess of, that authorized herein shall constitute a violation of the certification. Any anticipated facility expansions, production increases, or process modification which will result in new, different or increased discharges or expansion in steam generating capacity will require a submission of a new or supplemental application pursuant to Chapter 403, Florida Statutes.

XV. Noncompliance Notification

If, for any reason, the permittee does not comply with or will be unable to comply with any limitation specified in this certification, the permittee shall notify the Manager of DER's Southwest District Office by telephone during the working day in which permittee becomes aware of said noncompliance and shall confirm this situation in writing within seventy-two (72) hours supplying the following information:

a. A description and cause of noncompliance, and

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b. the period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying event.

XVI. Facilities Operation

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this certification. Such systems are not to be bypassed without prior Department approval. The one exception is that during periods when light oil is used for ignition, the FGD system may be bypassed.

XVII. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact resulting from noncompliance with any limitation specified in this certification, including, but not limited to, such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying event.

XVIII. Right of Entry

The permittee shall allow the Secretary of the Florida Department of Environmental Regulation and/or authorized respresentatives, upon the presentation of credentials:

a. To enter upon the permittee's premises where an effluent source is located or in which records are required to be kept under the terms and conditions of this permit; and

b. to have access to and copy all records required to be kept under the conditions of this certification; and

c. to inspect and test any monitoring equipment or monitoring method required in this certification and to sample any discharge or pollutants; and

d. to assess any damage to the environment or violation of ambient standards.

XIX. Revocation or Suspension

This certification may be suspended or revoked pursuant to Section 403.512, Florida Statutes, or for violations of any Condition of Certification.

XX. Civil and Criminal Liability

This certification does not relieve the permittee from civil

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or criminal responsibility or liability for noncompliance with any conditions of this certification, applicable rules or regulations of the Department, or Chapter 403, Florida Statutes, or regulations thereunder.

Subject to Section 403.511, Florida Statutes, this certification shall not preclude the institution of any legal action or relieve the permittee from any responsibilities or penalties established pursuant to any other applicable State Statutes or regulations.

XXI. Property Rights

The issuance of this certification does not convey any property rights in either real or personal property, tangible or intangible, nor any exclusive privileges, nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations. The applicant will obtain title, lease or right of use to any sovereign submerged lands occupied by the plant, transmission line structures, or appurtenant facilities from the State of Florida.

XXII. Severability

The provisions of this certification are severable, and, if any provision of this certification or the application of any provision of this certification to any circumstances is held invalid, the application of such provision to other circumstances and the remainder of the certification shall not be affected thereby.

XXIII. Definitions

The meaning of terms used herein shall be governed by the definitions contained in Chapter 403, Florida Statutes, and any regulation adopted pursuant thereto. In the event of any dispute over the meaning of a term used in these general or special conditions which is not defined in such statutes or regulations, such dispute shall be resolved by reference to the most relevant definitions contained in any other state or federal statute or regulation or, in the alternative, by the use of the commonly accepted meaning as determined by the Department.

XXIV. Review of Site Certification

The certification shall be final unless revised, revoked or suspended pursuant to law. At least every five years from the date of issuance of this certification or any National Pollutant Discharge Elimination System Permit issued pursuant to the Federal Water Pollution Control Act Amendments of 1972 for the plant units, the Department shall review all monitoring data that has been submitted to it during the proceeding five-year period for the purpose of determining the extent of the permittee's compliance with the conditions of this certification of the environmental impact of this facility. The Department shall submit the results of its review and recommendations to the permittee. Such review will be repeated at least every five years thereafter.

XXV. Modification of Conditions

The conditions of this certification may be modified in the following manner:

A. The Board hereby delegates to the Secretary the authority to modify, after notice and opportunity for hearing, any conditions pertaining to consumptive use of water, monitoring, sampling, groundwater, mixing zones, zones of discharge or variances to water quality standards.

B. All other modifications shall be made in accordance with Section 403.516, Florida Statutes.

XXVI. Flood Control Protection

The plant and associated facilities shall be constructed in such a manner as to comply with the Hillsborough County flood protection requirements.

XXVII. Effect of Certification

Certification and conditions of certification are predicated upon design and performance criteria indicated in the application. Thus, conformance to those criteria, unless specifically amended, modified, or as the Department and parties are otherwise notified, is binding upon the applicant in the preparation, construction and maintenance of the certified project. In those instances where a conflict occurs between the application's design criteria and the conditions of certificaiton, the conditions shall prevail.

XXVIII. Fine Mesh Screens

Fine mesh screens, similar to those tested and described by TECO in the 316 Demonstration, shall be installed on the intakes of Units 3 and 4 with the appropriate sprays and screen wash sluice return system to minimize entrainment. The screen wash sluice return system shall discharge to the east end of the canal north of the intake canal or to a location acceptable to the Department and EPA. TECO shall submit a plan to DER to explore the possibility of re-entrainment of ORC--returned organism.

XXIX. Noise

To mitigate the effects of noise produced by the steam blowout

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of steam boiler tubes and by construction of the Phase IV FGD byproduct disposal area, TECo shall conduct public awareness campaigns prior to such activities to forewarn the public of the estimated time and duration of the noise.

XXX. Variances

TECO is granted variances for discharges of boiler blowdown, FGD system blowdown and bottom ash pond blowdown pursuant to Sections 403.201 and 403.511(2) F.S., for a period of two years after the start of commercial operation for the following parameters:

a. Arsenic - 17-3.061(2)(a)
b. Cadmium - 17-3.121(9)
c. Chromium - 17-3.061(2)(d)
d. Copper - 17-3.121(11)
e. Iron - 17-3.121(16)
f. Mercury - 17-3.121(18)
g. Nickel - 17-3.121(19)
h. Selenium - 17-3.121(26)

During the period that the variance is in effect, TECO shall (1) determine the concentrations of the above metals as well as lead in the three discharge streams; (2) operate the FGD blowdown treatment system so as to minimize the metal content of the discharge from the system; (3) explore the practicability of treating the boiler blowdown in the FGD treatment system when there is capacity in the system to accomodate that blowdown; and (4) submit reports of the above studies and analyses after the first year and at least twenty months after the start of commercial operation of Unit 4. Based upon data from existing Units 1, 2, and 3 contained in the application, during the period of the variance, the quality of the boiler blowdown shall not exceed the following:

Arsenic	0.2	mg/1
Cadmium	0.005	mg/1
Chromium	0.065	mg/1
Copper	0.04	mg/1
Iron	0.001	mg/1
Lead	0.05	mg/1
Mercury	0.007	mg/1
Nickel	0.096	mg/1
Selenium	0.032	mg/1

Upon receipt of the aforementioned reports, the Secretary shall determine whether the variances should be renewed and may impose appropriate conditions to minimize the discharges and their impacts.

ATTACHMENT 2

STATE OF FLORIDA
Department of Administration
Division of Administrative Hearings
Oakland Building, 2009 Apalachee Parkway
TALLAHASSEE
32301

Chris H. Bentley
Director

Bob Graham
Governor

Nevin G. Smith
Secretary of Administratic

August 5, 1981

Honorable Victoria Tschinkel
Secretary, Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Re: Tampa Electric Company vs.
Department of Environmental
Regulation - Case No. 81-1463

Dear Secretary Tschinkel:

Enclosed is my Recommended Order in the referenced proceeding, along with Joint Exhibits 1 through 3 received into evidence at the hearing.

Copies of this letter will serve to notify the parties that my Recommended Order and the record have been transmitted to you on this date. Pursuant to Section 120.57 (b)(8), Florida Statutes, the parties are advised that they are allowed ten (10) days from the date of this Recommended Order to file written exceptions thereto with the Department of Environmental Regulation.

Please furnish the Division of Administrative Hearings with a copy of the final order rendered in this proceeding so that our files will be complete.

Sincerely,

Diane D. Tremor

DIANE D. TREMOR
Hearing Officer

DDT/sw
Enclosures
cc: Lawrence N. Curtin
Louis F. Hubener
Hamilton S. Oven

An Affirmative Action Equal Opportunity Employer

4-80

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

TAMPA ELECTRIC COMPANY,
Petitioner,

vs. Case No. 81-1463

DEPARTMENT OF ENVIRONMENTAL REGULATION,
Respondent.

RECOMMENDED ORDER

Pursuant to notice, an administrative hearing was held before Diane D. Tremor, Hearing Officer with the Division of Administrative Hearings, on June 23, 1981, in the Hillsborough County Courthouse, Tampa, Florida. The issue for determination at the hearing was whether the Department of Environmental Regulation should grant Tampa Electric Company's petition for a variance from certain Florida water quality standards for the discharge from the existing slag pond for Units 1, 2 and 3 of the Big Bend Generating Station located in Hillsborough County, Florida. The parties agreed upon all issues at or prior to the hearing and their Joint Exhibits 1, 2 and 3 were received into evidence.

APPEARANCES

For Petitioner:
Lawrence N. Curtin
Holland & Knight
Post Office Drawer BW
Lakeland, Florida 33802

For Respondent:
Louis F. Hubener
Assistant General Counsel
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

FINDINGS OF FACT

Upon consideration of the petition for a variance, the recommendation of the Department of Environmental Regulation and the prehearing stipulation of the parties, the following relevant facts are found:

(1) Tampa Electric Company is the owner and operator of the Big Bend Generating Station which presently consists of three coal fired steam electric generating units (Units 1, 2 and 3) in Hillsborough County, Florida. The Big Bend Generating Station is located on the eastern shore of Hillsborough Bay, a Class III body of water. Discharges from the Big Bend Station are subject to regulation by the Department of Environmental Regulation.

(2) The discharge that is the subject of this proceeding is from the slag pond currently serving Big Bend Units 1, 2 and 3. Tampa Electric Company originally requested variances from the surface water quality standards contained in Rules 17-3.051 (minimum criteria), 17-3.061(2) (general prohibition), 17-3.061(2)(a) (arsenic), 17-3.061(2)(d) (chromium), 17-3.061(2)(h) (lead), 17-3.121(9) (cadmium), 17-3.121(11) (copper), 17-3.121(16) (iron), 17-3.121(17)(lead), 17-3.121(18) (mercury), 17-3.121(19) (nickel), and 17-3.121(26) (selenium) of the Florida Administrative Code for the discharge from this existing slag pond. At the hearing, Tampa Electric Company withdrew its request for variances from the provisions of Rules 17-3.051 (minimum criteria), 17-3.061(2) (general prohibition), and 17-3.061(2)(h) and 17-3.121(17) (lead).

(3) Data collected by Tampa Electric Company during the period of 1970 through 1974, 1980 and 1981 demonstrate that the quality of the ambient intake water in Hillsborough Bay contains concentrations of arsenic, chromium, cadmium, copper, iron, mercury, nickel, and selenium in amounts which periodically exceed the applicable Florida water quality standards for that water body as contained in Chapter 17-3, Florida Administrative Code.

(4) Water quality data for the Big Bend Units 1, 2 and 3 slag pond discharge collected during the 1980-1981 study demonstrate that there will be either minimal or no net increase, or a reduction between the ambient intake and discharge for all metals except iron and selenium. Upon mixing with the flow in the discharge canal, water quality impacts due to these parameters are expected to be minimal.

(5) The Department of Environmental Regulation has recommended granting a variance for the parameters cadmium, mercury and nickel based upon the following:

(a) mercury concentrations decrease upon passing through the slag pond;

(b) cadmium and nickel concentrations remain the same passing through the slag pond; and, therefore,

(c) the slag pond system does not appear to contribute to the existing water quality violations for cadmium, mercury, or nickel.

(6) The Department of Environmental Regulation's analysis of the other parameters indicates that the concentrations of arsenic, chromium, iron and selenium increase in passing through the slag pond system. This increase appears to be due to an increase in suspended metals.

(7) Additional treatment of the discharge from the slag pond would be necessary to meet water quality criteria in the effluent for the parameters arsenic, chromium, iron and selenium. Compliance would require further removal of these parameters possibly by the use of a reverse osmosis treatment system. The cost of treating the slag pond discharge pond stream to comply with water quality standards by use of reverse osmosis would be approximately $28.2 million. The $28.2 million expenditure is not justified or practicable in this case. The Department of Environmental Regulation

agrees that this expenditure is not justified in this case and has recommended a variance for these parameters as well.

(8) The damage or harm resulting or which may result to Tampa Electric Company from compliance with the rules from which the variance relief is sought would be the expenditure of $28.2 million for an additional treatment system with no significant resulting benefit to the environment. The failure of the Department of Environmental Regulation to grant the requested variance could result in Tampa Electric Company being unable to operate this facility.

(9) The Department of Environmental Regulation recommends a two-year variance from the surface water quality standards contained in Rules 17-3.061(2)(a) (arsenic), 17-3.061(2)(d) (chromium), 17-3.121(9) (cadmium), 17-3.121(11) (copper), 17-3.121(16) (iron), 17-3.121(18) (mercury), 17-3.121(19) (nickel), and 17-3.121(26) (selenium) of the Florida Administrative Code for the discharge from the slag pond serving existing Big Bend Station Units 1, 2 and 3. The recommendation is conditioned upon Tampa Electric Company's agreement to monitor the metal content of the slag pond discharge, to evaluate alternative treatment systems and to submit a report describing treatment systems evaluated, including costs and feasibility, within eighteen (18) months of the effective date of the variance relief. Tampa Electric Company has agreed to the recommendation and conditions of the Department of Environmental Regulation.

(10) Appropriate public notice of this proceeding has been given. At the conclusion of the hearing, the public was given an opportunity to comment and present evidence on the petition for variance. No public testimony was offered.

CONCLUSIONS OF LAW

Within its discretion, the Department of Environmental Regulation may grant a variance from its rules relating to water quality for any of the following reasons:

> (a) There is no practicable means known or available for the adequate control of the pollution involved.
>
> (b) Compliance with the particular requirement or requirements from which a variance is sought will necessitate the taking of measures which, because of their extent or cost, must be spread over a considerable period of time. A variance granted for this reason shall prescribe a timetable for the taking of the measures required.
>
> (c) To relieve or prevent hardship of a kind other than those provided for in paragraphs (a) and (b). Variances and renewals thereof granted under authority of this paragraph shall each be limited to a period of 24 months except that variances granted pursuant to part II may extend for the life of the permit or certification. §403.201, Fla. Stats.

Also see Rule 17-1.57, Florida Administrative Code.

In this proceeding, the record establishes that the pond system does not contribute to existing water quality violations for cadium, mercury or nickel. Therefore, a variance for these parameters should be granted.

Due to an increase in suspended metals, the parameters of arsenic, chromium, iron and selenium increase when passing through the slag pond system. While the resulting water quality violations might be cured by the use of a reverse osmosis treatment system, the cost of so treating the slag pond discharge stream - $28.2 million - is not justified or practicable and would result in no significant benefit to the environment. Other less costly treatment or filtration systems to remove suspended metals should be explored and evaluated by Tampa Electric Company and the metal content of the slag pond discharge should be monitored. For these reasons, as well as the fact that Tampa Electric Company could lose its ability to operate this electrical power facility without a variance, Tampa Electric Company should be granted a variance from the rules relating to arsenic, chromium, iron and selenium.

Tampa Electric Company has withdrawn its requests for variances from the rules relating to minimum criteria, general prohibition and lead.

RECOMMENDATION

Based upon the findings of fact and conclusions of law recited herein, it is RECOMMENDED that Tampa Electric Company be granted a two-year variance from the surface water quality standards contained in Rules 17-3.061(2)(a) (arsenic), 17-3.061(2)(d) (chromium), 17-3.121(9) (cadmium), 17-3.121(11) (copper), 17-3.121(16) (iron), 17-3.121(18) (mercury), 17-3.121(19) (nickel) and 17-3.121(26) (selenium), Florida Administrative Code, for discharges from the slag pond for existing Big Bend Station Units 1, 2 and 3. The granting of this variance should be conditioned upon Tampa Electric Company's agreement to monitor the metal content of the slag pond discharge during the duration of the variance, evaluate alternative suspended metals removal treatment systems, and submit a report to the Department of Environmental Regulation describing the treatment systems evaluated and the costs and feasibility of those systems within eighteen (18) months of the effective date of the variance.

Respectfully submitted and entered this 5th day of August, 1981, in Tallahassee, Florida.

Diane D. Tremor

DIANE D. TREMOR
Hearing Officer
Division of Administrative Hearings
The Oakland Building
2009 Apalachee Parkway
Tallahassee, Florida 32301
(904) 488-9675

Filed with the Clerk of the Division of Administrative Hearings this 5th day of August, 1981.

Copies furnished:

See attached page

Copies furnished:

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Lakeland, Florida 33802

Louis F. Hubener, Esquire
Assistant General Counsel
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Hamilton S. Oven, Jr.
Administrator, Power Plant Siting
Department of Environmental
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Honorable Victoria Tschinkel
Secretary, Department Of
Environmental Regulation
Twin Towers Office Building
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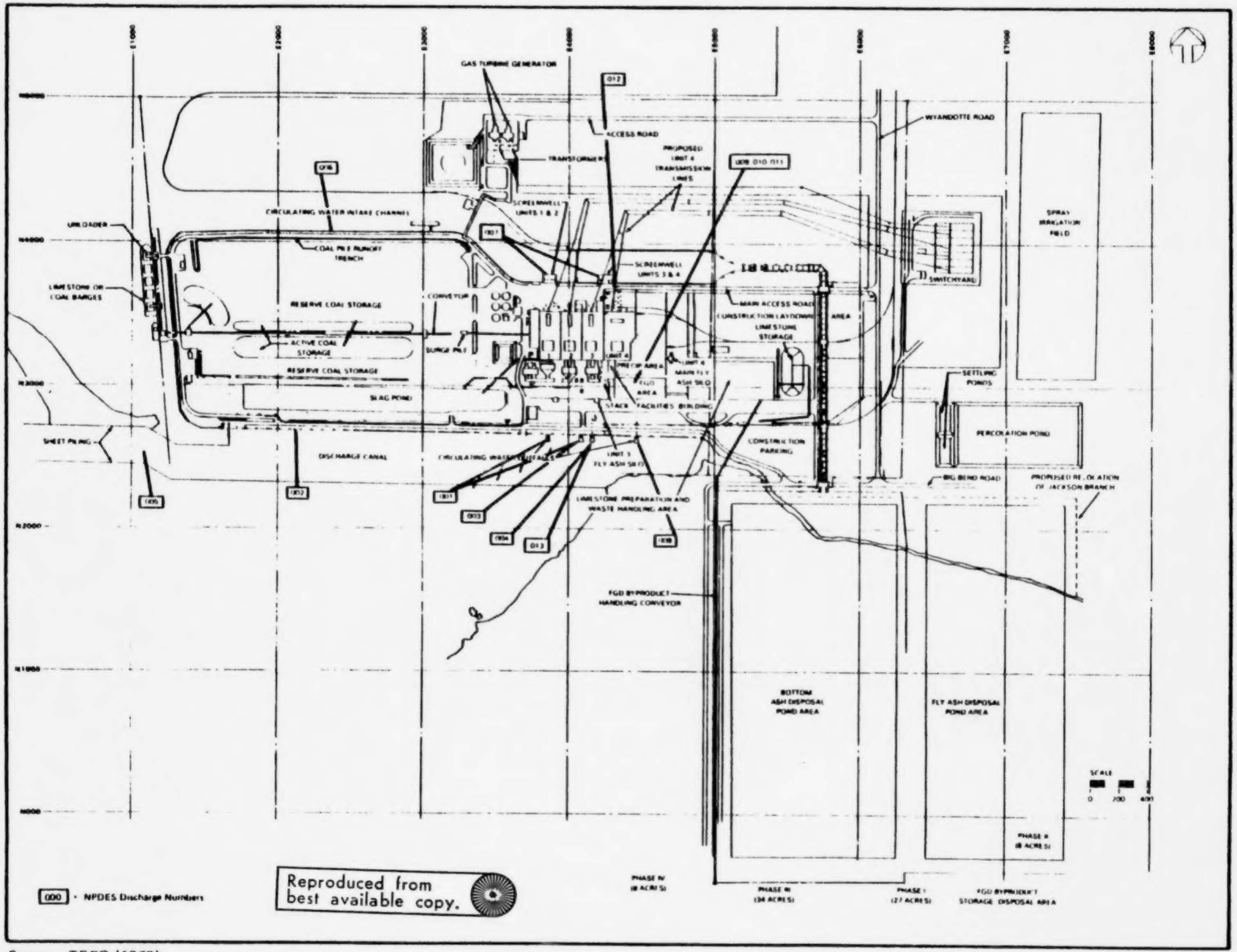
Tallahassee, Florida 32301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ACCESS ROAD
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PROPOSED UNIT 4 TRANSMISSION LINES
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WYANDOTTE ROAD
SPRAY IRRIGATION FIELD
016
CIRCULATING WATER INTAKE CHANNEL
SCREENWELL UNITS 1 & 2
007
UNLOADER
COAL PILE RUNOFF TRENCH
SCREENWELL UNITS 3 & 4
SWITCHYARD
LIMESTONE OR COAL BARGES
RESERVE COAL STORAGE
CONVEYOR
MAIN ACCESS ROAD
CONSTRUCTION LAYDOWN AREA
LIMESTONE STORAGE
ACTIVE COAL STORAGE
SURGE PILE
UNIT 4
PRECIP AREA
UNIT 4 MAIN FLY ASH SILO
FGD AREA
RESERVE COAL STORAGE
SETTLING PONDS
SLAG POND
STACK
FACILITIES BUILDING
PERCOLATION POND
SHEET PILING
DISCHARGE CANAL
CIRCULATING WATER OUTFALLS
UNIT 3 FLY ASH SILO
CONSTRUCTION PARKING
BIG BEND ROAD
PROPOSED RELOCATION OF JACKSON BRANCH
005
002
001
003
004
013
LIMESTONE PREPARATION AND WASTE HANDLING AREA
018
FGD BYPRODUCT HANDLING CONVEYOR
BOTTOM ASH DISPOSAL POND AREA
FLY ASH DISPOSAL POND AREA
SCALE
0
200
400
PHASE II (8 ACRES)
000 - NPDES Discharge Numbers
PHASE IV (8 ACRES)
PHASE III (34 ACRES)
PHASE I (27 ACRES)
FGD BYPRODUCT STORAGE DISPOSAL AREA

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Source: TECO (1979).

Figure 2-4. Plot plan, Big Bend Station.

HILLSBOROUGH ENVIRONMENTAL COALITION

TAMPA - HILLSBOROUGH COUNTY
P.O. Box 2800, Tampa, Florida 33601

Chairperson:
Sally Thompson
Vice-Chairperson:
Dorothea Cole
Secretary:
Joe Murdoch
Treasurer:
Hallie Calig

ACTIVE
ENVIRONMENTAL
ORGANIZATIONS:
Audubon Society
Save Our Bay
Citizens Aganist River Pollution (CARP)
Environmental Confederation of South West Fla. (ECOSWF)
Gulf Coast Lung Association
Sierra Club
League of Women Voters of Hillsborough County

September 1, 1981

Dario J. Dal Santo
EIS Project Officer
U.S. EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

RE: Comments on the Draft EIS
Tampa Electric Company
Big Bend Unit 4

Dear Mr. Dal Santo:

On behalf of the Hillsborough Environmental Coalition, which is comprised of concerned individuals and organizations in the Tampa Bay area -- such as Audubon Society, Sierra Club, Save Our Bay, Citizens Against River Pollution, Gulf Coast Lung Association, and various other civic associations, I would like to go on record expressing our concern with CONSERVATION measures and alternatives that have not been addressed adequately in this DEIS. Attached also are written comments by the Hillsborough Environmental Coalition's Air Quality Chair, Mike Kenney, and Water Quality Chair, Rich Paul.

It is the Coalition's hope that alternatives to power plants will be seriously considered in the future. Do we really need more power plants? Perhaps it will be concluded that additional power plants are not the answer, especially when we live in a county that has the dubious honor of having the worst air quality in the State of Florida. Because of our concern for the quality of life in Hillsborough County, which is a microcosm of all of the environmental problems and concerns in the State (such as growth, land use, air quality, water quality, energy, solid waste, etc.), we must seriously pursue the avenues of conservation and other alternatives. With a year-round temporate climate, Hillsborough County could be a showplace of the Nation.

HEC-1 We consider it unfortunate that EPA did not see fit to strongly pursue conservation as an appropriate management alternative for Big Bend Unit 4. We hope in the future that conservation and other alternatives to power plants will be strongly pursued.

Thank you for the opportunity to comment.

Sincerely,

Sally Thompson

HILLSBOROUGH ENVIRONMENTAL COALITION
Sally Thompson, Chairperson

Attachemnts: as noted

STATEMENT ON AIR QUALITY ASPECTS OF EPA DRAFT ENVIRONMENTAL IMPACT STATEMENT, Big Bend Unit 4, Mike Kenney, Air Quality Chair, Hillsborough Environmental Coalition

Hillsborough Environmental Coalition is concerned about potential air quality impact of the proposed project because the Big Bend site is within close proximity to the nonattainment areas for Ambient Air Quality Standards (AAQS), a portion of Hillsborough County designated as nonattainment for suspended particulate matter and a portion of Pinellas County that is nonattainment for sulfur dioxide.

A review of the DEIS for Big Bend Unit 4 indicates to us the need for clarification on the following points with regard to air quality.

- The modeling for SO_2 shows that the resultant estimated 3-hour concentration will be 84% of the AAQS.
- The modeling also shows that the impact on the Pinellas County SO_2 nonattainment area will be 80% of the allowed applicable emission offset for this facility. **HEC-2**
- Those computer modeling estimates are based on the assumptions that coal with a sulfur content of 3 to 6 pounds per million BTU's will always be available.

The Coalition is concerned that these SO_2 projects are very close to the AAQS and they are formulated on a weak and unrealistic assumption; that is, low sulfur coal will always be available. We feel that TECO must employ some SO_2 control technology to insure that the air quality is kept within prescribed health protection limits.

With regard to particulate matter, the total emission inventory for the new unit and associated facilities seems excessive. The combined calculated particulate matter emission volumes are as follows in terms of tons per years:

° coal handling facilities	
uncontrolled	900
controlled	120
° boiler	568
TOTAL	1,588

The value 1,588 tons of particulate matter released annually is not compatible with Hillsborough County's goal of cleaning up the nonattainment area that lies within a few miles of the site. **HEC-3**

The modeling for particulate matter as shown in Table 3-12 indicates that the Big Bend Units 1-4, with all interacting sources,will reach within 85% of exceeding the 24-hour standard.

Modeling for particulate matter of the entire facility must be redone showing the combined affect of the boiler, coal handling facilities and fugitive dust generated by moving vehicles.

STATEMENT ON WATER QUALITY ASPECTS OF EPA DRAFT ENVIRONMENTAL IMPACT STATEMENT, Big Bend Unit 4, Rich Paul, Water Quality Chair, Hillsborough Environmental Coalition

HEC-4 "Acid rain" is emerging as a problem of magnitude in North America. Several area newspapers have discussed the problem in Florida.(Enclosed in an article from the St. Petersburg Times, July 26, 1981.) The phenomenon is barely mentioned in the DEIS. Though coal washing and an SO$_2$ scrubber will be used to control SO$_2$ emissions, the Big Bend plant will remain the largest SO$_2$ producer in the County. In a statement of Environmental Impact, we expect a fuller recognition of the problem by both TECO and the EPA.

The DEIS fails entirely to consider the effect of thermal effluents on the seagrass/algal communities in the "embayment" area, immediately south of the power plant location. In this area, the community is already degraded due to thermal effects (Mangrove Systems, Inc., 1977; 1978 a,b; 1979). Further damage should be expected, but is not mentioned. In view of the documented 80% loss of seagrass meadows in Hillsborough County (Lewis and Phillips, 1981), any further loss or damage should not be permitted.

HEC-5 In addition, thermal discharges have been shown to adversely affect mangroves and associated fauna (Kolehmainen and Morgan 1972, Kolehmainen 1973, Canoy 1974). No mention is made of possible stress to embayment mangroves.

It is our understanding that as part of the permitting process for the previous units at Big Bend, an agreement was reached that if the present sheet pile wall was determined to be too short to prevent thermal effluent from entering the embayment and damaging biological communities there, it would be modified or extended. In view of the additional effect likely with the addition of Unit 4, we would appreciate clarification of the point.

We believe that the problem of thermal loading in the embayment requires further study. If it is shown to be a problem, modifications to the discharge canal and/or sheet pile wall should be required.

HEC-6 It is our understanding that ash and scrubber sludge storage areas present potential long-term toxicity problems from heavy metals contamination. TECO should give assurances of their commitment to maintain these sites in a manner safe environmentally and for public health, long after the expected life of the plant.

HEC-7 Finally, we urge that fine-mesh screening should be employed for Units 1 and 2 as mitigation for some of the unavoidable environmental effects of Unit 4.

Literature Cited

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Florida's rain is almost as acidic as its orange juice.

But it's lethal, not healthful.

We don't think much about rain, usually, unless there isn't any. Normally, rain goes about its business of filling our reservoirs and watering our lawns with such thoroughness that everything seems, well, right as rain. So it's easy to forget that rain has other work to do than to provide water for our lawns and our reservoirs. Rain cleanses the atmosphere of soil swept up by the wind, salt tossed up from the coastal sea spray, or gases spewed out of volcanoes.

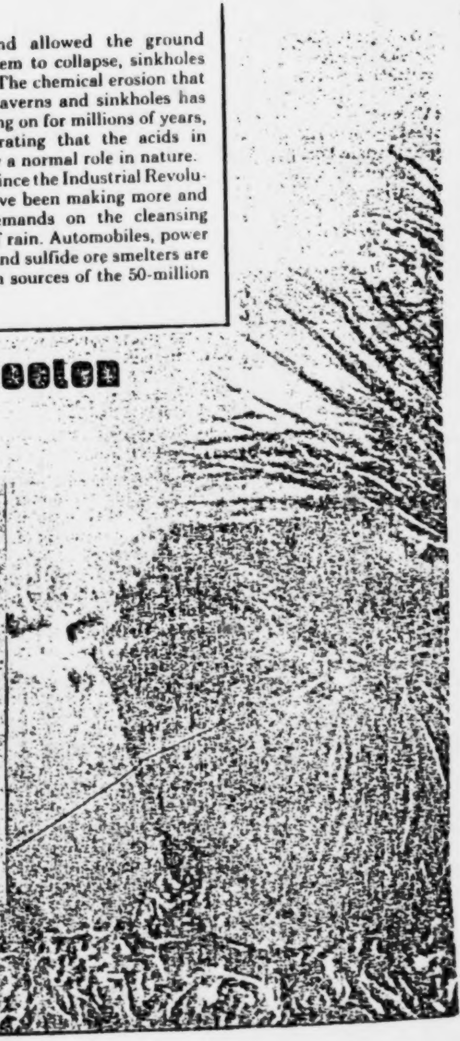
Airborne debris washed from the sky by the rain forms dilute solutions of alkalines or acids. Weak acids in rain may form underground caverns by dissolving limestone. When Florida's recent drought emptied those caverns of water and allowed the ground above them to collapse, sinkholes formed. The chemical erosion that creates caverns and sinkholes has been going on for millions of years, demonstrating that the acids in rain play a normal role in nature.

But since the Industrial Revolution, we've been making more and more demands on the cleansing power of rain. Automobiles, power plants, and sulfide ore smelters are the main sources of the 50-million

By Elizabeth Conner and Walt Wooten
Photos by Bob Bowden

The rain that can kill

You can't see it, you can't smell it, you can't feel it. It won't harm you. But the living organisms in Florida's lakes can't escape its lethal presence.



8 /FLORIDIAN, July 26, 1981

St. Petersburg Times

tons of sulfur oxides and nitrogen oxides that are emitted in the United States each year. They create a colossal cleaning job for rain.

We lend a hand in this clean-up effort only when we're forced to. Twenty years ago, we of the industrialized world were strangling on our own filth, coughing up in our phlegm what had only just been coughed up from our smokestacks. We didn't like it, so we issued regulations that say we can't dirty the air so much that it leaves people gagging.

Although air pollution is still with us, we are not allowing it to reach toxic levels in urban areas. We are still polluting the air at a prodigious rate, but we are spreading the pollution over a larger area. And now the rain has played a cruel joke on us by turning our local air pollution problems into a water pollution problem of global proportions.

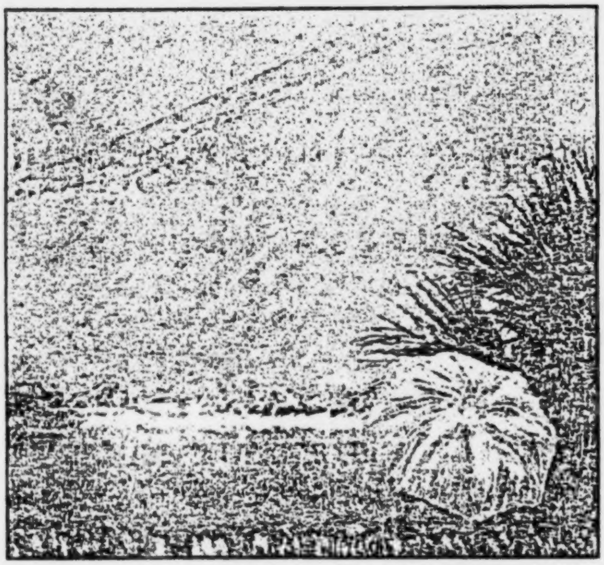
More than 2-million tons of sulfur oxides and nitrogen oxides are emitted annually in Florida, and the total is growing. After several days in the atmosphere, these pollutants may turn into sulfuric acid and nitric acid. How that happens is not exactly understood. But since the acids have become a part of our rainfall, the rain in Florida has become more than 10 times as acidic as it was 25 years ago.

Put enough of that kind of water in your fish tank and your aquatic pets will be found floating belly-up. In the Adirondack Mountains of New York, where the rain is more acidic than it is in Florida, 170 lakes are lifeless. Besides sterilizing lakes, acid rain can blemish a tomato, ruin a car finish, or eat away a marble statue.

But like orange juice that dribbles down your chin, acid rain is washed away by your next bath. Acid rain is no threat to human health.

Fish don't like it much, but fish don't write air pollution regulations. Still, folks in New York did get a bit testy when they found some of the finest mountain lakes in the world devoid of life. New York Gov. Hugh Carey has practically threatened to call out the state militia to halt midwestern pollutants at the state line. But there's not much New Yorkers can do about the Ohio power plants that create the mess, and it could take the affected lakes hundreds of years to recover.

No one knew acid rain was falling in Florida until 1977, although it may have begun falling on North Florida almost a decade ago. No one knows how acidic normal rain should be, although it's believed that before the Industrial Revolution rain rarely was acidic at all. Florida's summer rainfall averages 12 times the acidity of what scientists consider to be the most acidic normal rain. At times, an individual Florida rainfall may be 80 times as acidic as normal rain.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Almost all of the acid in Florida's rain is sulfuric acid or nitric acid. Nitric acid falls uniformly across the state year-round and it has multiplied 4.5 times in the past 25 years. Sulfuric acid falls mostly in North and Central Florida and mostly in the summer. It has multiplied 1.6 times in the past 25 years. At least twice as much sulfuric acid falls on Florida as does nitric acid, so sulfuric acid is considered the primary cause of the state's acid rain.

Acid rain is like a noise that goes "bump!" in the night. You can't quite tell where it's coming from. You don't know if you've ever heard it before, because you've never listened for it. Just when you've decided there's nothing there at all — bump — there it goes again.

Only a few scattered measurements of atmospheric chemistry were made in the early part of this century. In the 1950s, a systematic measuring network was established in Europe, and in 1959, a Norwegian fisheries inspector named Dannevig suggested a connection between acid rain and the declining fish populations in Norwegian and Swedish lakes and rivers. In 1968, Swedish scientist Svante Oden concluded acid rain was a widespread problem throughout Europe.

Until 1972, it was not believed that acid rain was widespread in the United States. Then Gene Likens and F. H. Borman of Cornell University reported their belief that acid rain was falling across the northeastern United States. Since then, acid rain has been discovered across the eastern United States and in the far West. Patrick L. Brezonik and his co-workers at the University of Florida in Gainesville discovered in 1977 that acid rain falls across most of Florida.

Rainfall was almost never measured for acidity in the United States until the 1960s, and not very consistently even then. But scientists can approximate the acidity of rain if its chemical composition is known. Using such approximations, Likens and others have concluded that acid rain was falling over much of the Northest by 1955 and that it has spread since — like ink from an overturned bottle — to the south and west.

Reproduced from best available copy.

In 1977, Brezonik and his co-workers were the first to systematically measure the acidity of rainfall throughout Florida. They found acid rain falling throughout the state, with the most acidic rain falling in the north and in the interior. The half of the state that lies north of the southern boundary of Hillsborough County is the worst hit. But how long has acid rain been falling in Florida? Without historical data, it would have been difficult to prove anything unusual was going on.

Fortunately, two chemical analyses of Florida's rain were made in the 1950s, one by the Air Force Cambridge Research Laboratory and the other by the U.S. Department of Agriculture. Neither study measured acidity, but inferences based on the chemical ions measured by those studies indicate that Florida's rainfall was not acidic in the 1950s. One thing the two studies clearly show is that nitric oxides and sulfur oxides — the stuff acid rain is made from — have increased substantially in Florida's rain during the past 25 years.

So we in Florida have heard the noise, decided that we've never heard it before, and gotten a vague idea of where it's coming from — sulfur oxides and nitric oxides. But so what? Why not drink a warm glass of milk and go back to sleep? We might do just that were it not for the reports of our neighbors — in New York, Canada, and Scandinavia — about the disastrous consequences of their not getting out of bed to take a look around.

Elsewhere, acid rain has caused fishkills when spring thaws melt acidic snow and flood lakes and streams with strong doses of acidity. Acid rain usually is a less dramatic poison, causing gradual reproductive failures rather than sudden death. Sometimes acid rain leaches toxic metals from the surrounding soil and sends in these poisons to do its dirty work. Regardless of the method, the eventual result is a lake devoid of fish, mollusks, frogs and aquatic insects. Acid rain is an invisible poison; it leaves no trail of slimy oil or turbid foam. The lakes are left crystal clear, sparkling blue and biologically dead.

Lakes are the first places to suffer from acid rain, but they are not the only environmental targets. On land, acid rain can leach valuable nutrients from the soil. It attacks plants by poisoning the soil and by damaging the foliage. On farms, it can blemish tomatoes and healthy and to be reproducing. But in measuring nine largemouth bass from two acidic lakes, Schulce found they weighed much less for their size than largemouth bass from other Florida lakes.

It's unclear whether the bass are skinny because of acid rain. Their size might be because of the added stress of increased acidity. Or it might be because acidic lakes have less for the bass to eat. Schulce found that acidic lakes have fewer of the floating microscopic plants and animals that are the basic food for other lake-dwellers.

Those skinny largemouth bass may be the first known victims of Florida's acid rain, although Brezonik calls the data "very inconclusive." But the good news is that Schulce's study found that the plants and animals of the Trail Ridge lakes seem more resistant to acidity than those in lakes studied by other researchers in the northern United States and Europe. That may be because many lakes and rivers in the Southeast are somewhat acidic naturally.

The acidity of lake water may not prove to be the most damaging aspect of Florida's acid rain, however. Reseachers suspect acid rain is leaching toxic aluminum from the surrounding soil into the Trail Ridge lakes. The acidic lakes studied by Brezonik and his co-workers have "significantly higher" concentrations of aluminum than do non-acidic lakes. In sufficient concentrations, aluminum can damage the gills of fish and kill them.

Although acid rain has the capacity to inflict severe environmental damage, researchers say no crisis is imminent. But no one knows what might happen in the future as acid rain accumulates in the environment and as the rain becomes more and more acidic. So Brezonik and other researchers have begun another series of experiments at one of the Trail Ridge lakes. Three small sections of McCloud Lake have been isolated so researchers can test the effects of increased and decreased acidity on the lake's plants and animals. Nearby, other researchers are sprinkling soil plots with simulated acid rain to test its effects on soil chemistry, microorganisms, and plants.

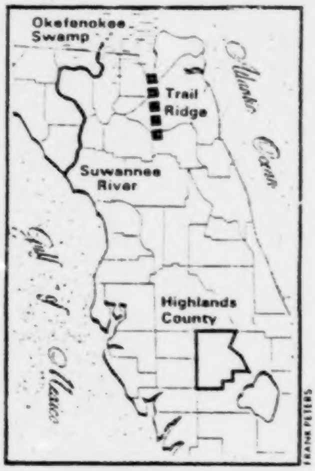
Environmental policy makers need to know how much acid rain the fragile Trail Ridge lakes can handle, because eliminating acid rain is out of the question. Instead, officials need to know how close we can come to the precipice of environmental disaster without falling over. For at least the next 20 or 30 years, doing anything to curb acid rain is going to be expensive. The kicker is that it's going to be expensive for you.

Florida's acid rain is caused primarily by its own power plants, so any efforts to combat acid rain are going to show up on your electric bills. The state's electric utility executives are so concerned about the problem that they have approved a one-year, $485,000 study that will measure acid rain at 14 sites around the state. Staff members of the Florida Electric Power Coordinating Group, which represents 17 of the state's electric utilities, want to make this project the first part of a three-year, $2.6-million study.

Even to the state's electric utility executives, $2.6-million is not spare change. They're considering spending so much money to keep track of acid rain because they know the finger of blame is beginning to turn toward them. Few of Florida's pollutants come from the Midwest because our tropical air masses push most of these northern pollutants away. Florida gets a smidgen from other Gulf Coast states, but most of Florida's acid rain seems to be homegrown.

→ next page

HOT SPOTS: Above: The nation's acid rain areas. Below: Acidity at the juncture of the Okefenokee Swamp and the Suwannee River is fine; in the Trail Ridge area and in Highlands County, it's not.



FRANK PETERS

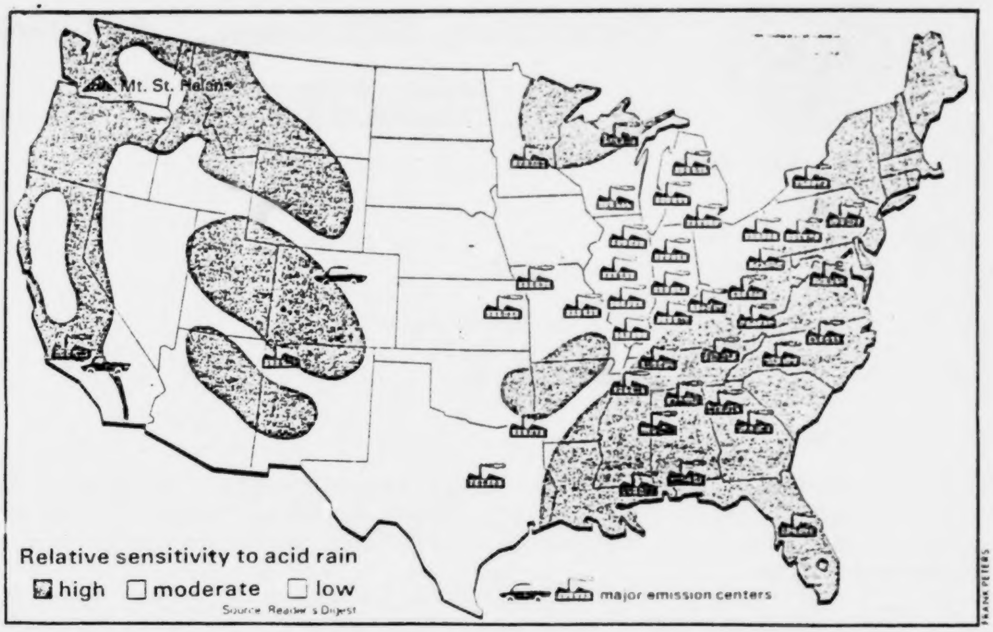
The catch is that what we reap isn't what we've sown.

Two-thirds of Florida's acid rain is caused by sulfuric acid. Power plants do not emit a drop of sulfuric acid, but they do spit out more than one million tons of sulfur oxides each year. For reasons no one entirely understands, once in the atmosphere sulphur oxides sometimes change into sulfates, which later may become sulfuric acid.

Each smokestack scatters the seeds of acid rain, but not all the seeds germinate. There is as yet no way to trace the sulfur oxides from a particular smokestack across hundreds of miles and through various chemical changes until it becomes acid rain. That would require sophisticated computer models that explain what happens to sulfur oxides in Florida's atmosphere. For all we know, the pollutants from a particular smokestack may drift off to sea or fall to Earth before they can turn into acid rain.

Eventually, we will learn precisely who is responsible for our harvest of acid rain, perhaps as a result of the utility group's study. That will not make solving the problem easier, however. Air pollution regulations might be compared in complexity to the federal income tax laws. Even within the same industry, the applicable regulations differ according to the age, location and fuel of an individual plant. Sometimes the pollution control equipment required for a new power plant isn't decided upon until after the plant is built and its smokestack gases are measured.

If enough sulfur oxide is measured around a power plant, new or other-



Source: Reader's Digest

HOT SPOTS: Above: The nation's acid rain areas. Below: Acidity at the juncture of the Okefenokee Swamp and the Suwannee River is fine; in the Trail Ridge area and in Highlands County, it's not.

wise, the regulators will jump into action. High concentrations of sulfur oxides are a threat to human health. But the sulfates formed from sulfur oxides are not really regulated, because they pose no known health threat. Controlling sulfates as well as sulfur oxides would attack the problem head-on, but that would require regulations based on more than just human health concerns.

The great irony is that one of the ways we combat air pollution causes acid rain. An inexpensive way to dilute the concentrations of sulfur oxides near power plants is to build tall smokestacks which send the pollutants high into the atmosphere where they are blown away. Unfortunately, after several days of drifting in the upper atmosphere sulfur oxides are likely to turn into acid rain. In attempting a quick fix to local air pollution problems we have created a new problem for other communities many miles downwind.

Current federal air pollution regulations cannot cope with acid rain because it was practically unheard of when Congress passed the Clean Air Act in 1970. The act is up for renewal this year, and many industry groups are lobbying to relax emission standards they say are too costly or unnecessary. Keeping these forces from gutting the act will be difficult in light of the new anti-regulatory mood in Washington, so expanding the act to cover acid rain seems doubtful.

Yet environmentalists say their goal is to revise the act so it can be used to combat acid rain. The League of Women Voters, the American Lung Association, the Sierra Club, the Environmental Defense Fund, the Friends of the Earth, and the Natural Resources Defense Council say their goal is to revise the Clean Air Act so that preventing acid rain is given equal footing to protecting human health. That might mean banning tall smokestacks as a pollution control measure and controlling the emission of sulfates as well as sulfur oxides.

Whatever the outcome of this national debate, Florida's acid rain probably will get worse. More and more sulfur oxides will be dumped into Florida's sky during the next 20 to 30 years. One reason is that more power plants will be built, many of them in the interior of the state where their emissions are less likely to drift out to sea. Another reason is that Florida will be producing more of its electricity from coal — a notoriously dirty fuel.

New power plants must meet fairly strict emission standards, so as our present power plants are replaced, emissions should slack off. But many plants will be in use for another 30 years. As many as 42 oil-fired plants could be converted to use coal, and they might not have to meet the strict standards that new plants do. Imposing stricter standards on such converted plants would raise the cost of conversions substantially, perhaps eliminating the advantage of converting from expensive foreign oil to cheaper domestic coal.

Utility executives say too little is known about acid rain to justify tightening emission controls. Charlie Henderson, a Florida Power & Light executive who heads a subcommittee on acid rain for the Florida Electric Power Coordinating Group, challenges the interpretations of some researchers. He points out that the oft-cited lack of acidity in the lakes and rainwater of 20 years ago is based on circumstantial evidence.

"There are a lot of so-called facts as to whether there is a trend," Henderson says. "We feel there is a lot of supposition out there."

Henderson and other utility executives chafe at the idea of putting flue-gas desulfurization scrubbers, an effective but expensive emission control, on coal-fired plants. "You could put scrubbers on and have no decrease in acid rain," Henderson says. "That would be a very expensive lesson."

An equally expensive lesson, however, might be to ignore the problem until a crisis develops. One economist told a Senate hearing last year that acid rain causes between $500-million and $50-billion in environmental damage to the United States annually. There is no estimate on what it might cost Florida.

Those nine skinny largemouth bass yanked from two North Florida lakes last year may not mean much to you now, but if their kith and kin should eventually die, you may have to put your money where their gills are. ●

Elizabeth Connor and Walt Wooton are free-lance writers living in Gainesville

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St. Pete Times

United States Department of the Interior
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER 81/1412

SEP 3 1981

Mr. John E. Hagan, III
Chief, EIS Branch
Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Hagan:

We have reviewed the Draft Environmental Statement for Issuance of NPDES Permit for Big Bend, Unit 4, Tampa Electric Company, Hillsborough County, Florida and have the following comments.

DOI-1 Our Bureau of Mines Mineral Industry Location System (MILS) data indicate that phosphate, limestone, and peat deposits are actively mined in the region. However, the draft does not address mineral resources or mineral production. The final report should acknowledge the existence of mines and potential mineral resources within the project area and should define any adverse impacts that the proposed action may have on mineral production. If no mineral resources will be affected, a statement to that effect should be incorporated in the report.

DOI-2 Page A-11, paragraph M. Although we note that our recommendations for preventing adverse impacts to the West Indian Manatee are discussed in the draft NPDES permit, we are concerned with the wording of this paragraph. As written, it states that the permittee shall coordinate and work with the Department's Fish and Wildlife Service (FWS) to mitigate potential impacts "should significant impacts occur to the manatee." Our FWS recommendations were intended as a preventative measure to avoid impacts, not as a cure to be implemented after significant impacts had occurred. Ninety dead manatees have been reported and discovered in the southeast from January 1, 1981 to July 31, 1981. Eighteen of these deaths have been positively linked to collisions with boats or barges. Boat traffic has undoubtedly contributed to more deaths for which the cause of mortality cannot be absolutely determined. Considering the critical nature of this problem, we believe it is inappropriate to delay implementation of our recommendations until after the impacts have occurred.

We therefore urge that paragraph M be written to require the closure of the boat ramp from November 15 to March 30. If this is not accomplished, we will reinitiate formal consultation pursuant to Section 7. The prevention of injuries and deaths of manatees is very important. We believe that the applicant would be able to relocate this boat ramp to an area that is not utilized by this species.

Sincerely,

Bruce Blanchard, Director
Environmental Project Review

A-95 #201-81; TECO Big Bend Unit 4 Draft Environmental Impact Statement, Hillsborough County

CLEARINGHOUSE REVIEW

The Environmental Protection Agency has requested review and comment on a draft Environmental Impact Statement regarding issuance of a New Source National Pollutant Discharge Elimination System Permit for Tampa Electric Company's proposed 417 megawatt capacity coal-fired steam electric generating plant at the existing Big Bend Complex in Hillsborough County.

Local Comments Requested From:

Hillsborough County City-County Planning Commission: See attached letter dated July 23, 1981.

City of Tampa Planning Department: See attached letter dated July 21, 1981.

Council Comments and Recommendations

CR-1 This project has been reviewed for consistency with the Council's Areawide Water Quality Management Program and the Council's adopted growth policy, the Future of the Region. The proposal has been found to be consistent with Council policy to ensure that public and semi-public facilities are planned as an integral part of community development and redevelopment in areas suitable with respect to the protection of the environment and energy efficiency.

CR-2 The purpose of this EIS is to identify the environmental problems caused by the location, capacity, fuel and by-products of this electrical generating facility. It is evident that while the plant will have an impact on the environment of the Tampa Bay Region, all necessary steps have been taken to minimize this impact. Stack scrubbers will be employed to remove fly ash and sulfur dioxide from emissions, a fine-mesh screen will be used to prevent intrainment of marine organisms within the cooling water intake canal, an earthen-diked disposal cell will be constructed for the on-site disposal of gypsum and fly ash.

CR-3 The socioeconomic benefits to be derived from this project will be the provision of sufficient back-up generating capacity so that TECO and the customers within its service area can benefit from availability of sufficient electrical power during peak load times. This in turn will eliminate the necessity of TECO purchasing power from other electrical utilities in and out of the state.

This project is regionally significant and no regional concerns have been identified during the review which would preclude its approval. It is therefore recommended that this proposal be approved for funding. Further, it is recommended that any comments addressing local concerns be considered prior to approval.

Committee adopted September 4, 1981.

Jan Platt

Commissioner Jan Platt, Chairman
Clearinghouse Review Committee

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ENVIRONMENTAL IMPACT STATEMENT BRANCH
REGION IV EPA

-over-

tampa bay regional planning council
9455 Koger Boulevard St. Petersburg, FL 33702 (813) 577 5151 Tampa 224-9380

COUNTY COURTHOUSE
P.O. BOX 1110
TAMPA, FL 33601
TEL. (813) 272-5940

58

HILLSBOROUGH COUNTY CITY-COUNTY PLANNING COMMISSION

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WILBERT WILLIAMS

RONALD N. SHORT
EXECUTIVE DIRECTOR

July 23, 1981

MEMO TO: Mike McKinley, TBRPC

FROM: Hans Zarbock, Community Planner

SUBJECT: A-95 No. 201-81 TECO Big Bend Unit 4, DEIS

The referenced expansion of the existing power station is in conformance with the Horizon 2000 Plan.

Although the fourth unit will increase the station's environmental impact through air pollution, thermal effects and entrapment and entrainment of marine organisms the recent 316 Demonstration has indicated that Best Available Technology will be used to minimize these impacts. TECO should be encouraged to continue their biological monitoring program. CR-4

MM/lc

cc: Christie Supp, ODC

CITY OF TAMPA

Bob Martinez, Mayor

Department of Revenue and Finance

Bureau of City Planning

July 21, 1981

Mr. Michael R. McKinley, Chief
Governmental Services Division
Tampa Bay Regional Planning Council
9455 Koger Boulevard
St. Petersburg, FL 33702

Dear Mr. McKinley:

Re: TBRPC A-95 Clearinghouse Review No. 201-81; TECO Big Bend Unit 4
Draft Environmental Impact Statement, Hillsborough County

This project is compatible with all existing plans.

CR-5

Thank you for the opportunity of reviewing this project.

Sincerely,

Joan T. Smith

Joan T. Smith
Director of Project Planning
and Grants Administration

/mlw

City Hall Plaza-8E • Tampa, Florida 33602 • 813/223-8486

SIERRA CLUB
FLORIDA CHAPTER

1601 NW 35 Way
Gainesville, FL 32605
Sept. 14, 1981

Mr. Dario Dal Santo
EIS Branch
U.S. Environmental Protection Agency
345 Courtland St. NE
Atlanta, GA 30365

Dear Mr. Dal Santo:

The Power Plant Siting Committee of the Florida Chapter Sierra Club has made numerous comments to EPA regarding the EIS for the TECO Big Bend 4 power plant. Since some of these comments have been sent to EPA well in advance of the issuance of the Draft EIS and the subsequent public hearing, I would like to make sure that all of these comments are included and addressed in the Final EIS. Copies of our previous comments, all of which have been sent to EPA in the past, are enclosed for the formal record.

1. January 20, 1981--comments on 316 hydrology and biology SC-1
2. February 14, 1981--comments on 316 hydrodynamic modeling SC-2
3. March 28, 1981--comments on replies to questions from TECO SC-3
4. July 23, 1981--letter to FDER stating we are not convinced of negligible environmental impact from the once-through cooling (copy not sent to EPA). SC-4
5. December 13, 1980--comments to FPSC where we stated "Neither the TECO Site Certification Application nor the PSC preliminary report of October 15 thoroughly identify or evaluate the conservation measures reasonably available to TECO." SC-5
6. February 1, 1981--letter to EPA outlining our concerns with the Draft EIS structure which would not adequately address alternatives. SC-6
7. August 19, 1981--Sierra Club statement (with Attachment I) which expressed concerns with the environmental SC-7

impacts of the TECO Big Bend 4 plant and which showed an alternative that was less environmentally damaging.

Before concluding, let me reiterate the position of the Florida Chapter Sierra Club on the EIS for the TECO Big Bend 4 plant:

Under NEPA, EPA has a legal responsibility to identify and study all viable alternatives. This has not been done, and the Sierra Club formally requests that EPA adhere to the requirements of the law in formulating the Final EIS for the TECO Big Bend 4 plant.

Thank you for your consideration.

Yours truly,

Barney L. Capehart

Barney L. Capehart
Chairman, Power Plant Siting
Committee

SIERRA CLUB
FLORIDA CHAPTER

1601 NW 35 Way
Gainesville, FL 32605
January 20, 1981

Mr. H.S. Oven, Jr.
Power Plant Siting Administrator
Dept. of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32304

Dear Mr. Oven:

Our consultant, Mr. D.S. Graham, has completed his review of the documents submitted by TECO for the 316 Demonstration Study. A copy of his comments on §§ 4-8 is enclosed.

On November 10, 1980, I sent you a handwritten copy of Mr. Graham's earlier comments. (A typed copy will be forwarded shortly.) Have you had an opportunity to review these comments yet?

Yours truly,

Barney L. Capehart

Barney L. Capehart
Power Plant Siting Committee
Chairman

cc: EPA (with enclosures)
TECO (with enclosures)
Tampa Bay Sierra Club Group (with Enclosures)

COMMENTS ON THE BIOLOGICAL SECTIONS OF THE TECO CERTIFICATION APPLICATION

-Sierra Club-

1. General Comments

Comments on the material presented in §§4-8 of the TECO 316 a and h Demonstration for Big Bend station are presented herein. Previous comments have been submitted regarding the hydrodynamic/thermodynamic modeling aspects of this study. The intent here is to take a more general overview than was provided in the previous review.

The Applicant has provided an overwhelming amount of biological data. A general comment is that the data appears to be poorly drawn together so as to present clear lucid conclusions. A preliminary attempt to do so will be made here. Furthermore, the conclusions are based upon some dubious assumptions and methods from an analytical point of view (i.e. the validity of the hydrodynamic and population modeling), and may be invalid to the extent that these supporting assumptions err.

2. Description of the General Problem

The general problem is poorly outlined in the study and needs to be clarified in order to assess the analysis. It is proposed to enlarge an existing plant, therefore

1. some impacts are already occurring
2. these will presumably be increased

3. mitigation measures can be applied to the increment, or to the entire plant,

We support plant-wide mitigation. Since the plant already exists, some site-specific impact data can be gathered.

The impact zones and types can be dissaggregated as

A. Intake
  - i) entrainment
  - ii) impingement

B. Outfall
  - i) discharge canal and near zone
  - ii) dilution pump and canal
  - iii) near-plant thermal effect area
  - iv) far-plant effects (primarily from entrainment).

The dilution pump studies and other biological data indicate severe effects and high mortality in the discharge canal area. This area then is to be "written-off," and the major effects of the larger plant will be to extend its relatively small impact area. The far-field area will be impacted by losses of organisms due to entrainment and impingement. We have noted problems with the DISPER-1 modeling of this effect earlier, and this has apparently been deemphasized. We do have some reservations about the rather simple population model used, and this will be discussed anon.

The area of largest incremental impact is the near-plant coastal zone. As pointed out in our earlier submission, this is just the area where the results of the far-field (CAFE) and discharge-canal models are least valid--largely by virtue of inappropriate grid size in the larger model and some rather severe and likely inappropriate assumptions in the near-field. Any conclusions based on either model as they affect the near-plant zone are not considered reliable by us.

This leads to the conclusions regarding the incremental temperature analysis. Quite frankly, we doubt that the patterns represented by Figures 6.2-2 and 6.2-3 exist. No field data to substantiate them are given in spite of the existence of an operating plant. Further, as noted before, we doubt that the type of data presented in Table 6.2-2, or referred to on p. 2 of the thermal effects study, is valid insofar as a steady-state model was used in an area where tidal hydrodynamics dominate (at lower values of ΔT, at least). Hence, in order not to be overly repetitive, any conclusions about biological response based on hydrodynamic modeling in the area just beyond the discharge canal are viewed very skeptically by us.

The proposed plant will use the same discharge and intake system as the present plant. The dilution system appears to have a very high mortality rate at some times, hence its effect may not be very beneficial. The net motion in the bay is not great, hence there is some chance that the water may cool and recirculate locally. No study of this pattern has been investigated, by a dye test or other means. (The comments regarding the dispersion coefficient on p. 7.1-5 are especially confusing when viewed in this context).

Finally, as noted later, the intratidal variations and short-term thermal variations have been ignored in the biological analysis (with perhaps the exception of some very unusual comments about gradients on p. 7.1-6), and these may also need to be addressed.

3. Approach

The Demonstration is reviewed in the context outlined by EPRI in its report:

> Methodology For Assessing Population and Ecosystem Level Effects Relating to Intake of Cooling Waters, EPRI-EA-1238, Nov. 1979.

The basic approach, as outlined therein, is

1. Estimate the total annual impingement and entrainment mortality for each species.
2. Estimate source waterbody abundances.
3. Develop a relationship between plant mortality and the population.
4. Evaluate the role of potentially impacted populations in the biotic community through food webs and community analysis.
5. Determine the need for comprehensive analyses.

To the extent possible, the text of the Demonstration itself will be followed.

Section 4

In section 4 a voluminous amount of data is presented with a miniscule amount of linkage, summary, or conclusion.

The first thing that needs to be addressed is the validity of the sampling scheme itself. This has both spatial and temporal aspects.

Samples were apparently taken at 2 week intervals, with day and night samples being taken. This assumes

1) that variations at a given point in the Eulerian frame used over a tidal cycle were small relative to those over a fortnight.

Explicitly, that

$$\frac{\partial *}{\partial t} \approx \frac{d *}{d t}$$

and hence that

$$\frac{\partial *}{\partial t} >> u_j \frac{\partial *}{\partial x_i}$$

where * is the quantity being measured at the sampling station. We would like to see intratidal data to substantiate this premise.

2) that diurnal variations in * are large relative to tidal ones.

Since the diurnal period is 24 hrs., and the tidal is about 25, we do not see how the sampling technique used could verify this assumption.

Further, we see no data delineating the thermal plume in the field in both plan and the vertical so that sampling locations relative to it would be known. As noted, we have no confidence at all in the near-field model predictions beyond the entrance of the discharge canal.

If the F-ratio data in Tables 4.5-7, 10, 11, 12, 13 are regarded, for instance, it can be seen that trip variance is often large compared with station variance. Can this trip variance be further subdivided into intratidal and nontidal variations? If so, would the intratidal variation increase the F-level of the station variance?

The following conclusions are drawn from the masses of analyzed data in 4.

1. On pp. 4.4-4 and 4.4-5 it is noted that

pollution tolerant benthic organisms thrive in the canal discharge areas. For instance, C. capitata comprised 41% of the samples in the canal, yet 1% away from it.

2. Density values are lower in the canal.
3. Note the scales differ on the figures in Figure 4.4-9, and that the discharge canal area has lower values.
4. On p. 4.6-2 it is noted that few fish were caught in the discharge canal area (stations TB-1, TB-6).
5. Finally, if the F-ratios for some RIS's are examined, it is seen that the impact, by station, appears to be very stage-dependent. See Zoca on Table 4.5-13 for instance. This indicates that a rather sophisticated population model is required.

Given the mass of biological data presented, very little of a summary nature is provided to tie it together. In particular the differences between assemblages within and without the plume are not highlighted. Even more surprisingly, it is not clear just which stations were inside and outside of the plume on a given sampling date, or on the average. All that is clear is that stations which were definitely in the thermal plume were adversely impacted.

Comments on Section 5

Section 5 is somewhat more cohesive and coherent. We have no argument with the RIS's chosen. In general, however, it is not made clear that the species are to be only representative. Saying that there is no impact to oysters since few are in the area is irrelevant since the oyster is supposed to represent sessile organisms which definitely would be impacted because of their lack of mobility.

The mortality appears to depend not only upon the value of the temperature, but also upon its rate of change. Note comments to this effect in paragraph 5, p. 5.2-2, and the last sentence of p. 5.2-9, among others; as well as in Tables A.-6. Rapid changes in temperature would be expected to occur near the edge of the plume as it is tidally advected. These effects also need to be discussed and evaluated.

A final comment on section 5 is that both shrimp larvae (p. 5.2-9) and spotted seatrout larvae (p. 5.2-30) are not entirely passive, and hence some type of multilayer approach might be needed to describe their dynamics. This is not warranted for this investigation, however.

Section 6

Comments have already been made in other submissions about the need for biocide modeling and toxicity assessment, as distinct from nearshore thermal modeling. Our dubiety about the data as presented in Tables 6.1-1 to 3 has already been noted, and the reasons given previously in our review of Amendment 5. The plots shown as Figures 6.1-5 and 6 need to be compared to field data to be convincing. Vertical (x-z) information should be illustrated also. Note that the near-field model is 2-dimensional (r, z) and steady-state. The two-dimensionality in plan (r, φ) shown in Figures 6.1-5, 6 is assumed and not proven. We surmise more tidal advection and dispersion occurs, more tendency to hug the shore, and more re-entrainment than is indicated.

This may be the appropriate place to discuss the fine-mesh screen, intake, and discharge. The PV costs of a screening system, including retrofit, is given as $18.2M on p. 6.2-7. It would be absurd from a scientific context to leave the existing units unscreened if it is determined that screening is needed for the new one. On p. 7.4-1, the one-sentence line that

> since the station's effect on aquatic populations is not adverse, the utilization of a fine-screen mesh is not warranted

is presented. This is a nice try, but we must challenge this assumption and conclusion. The challenge is based on 2 points

1) As noted in our review of the data of §4, adverse effects do occur; the question is whether their degree is significant enough to justify a $18.2M expenditure. We challenge the Applicant to demonstrate that no adverse effects occur, as alleged on p. 7.4-1.
2) The statement is based upon results from the population modeling, which are inadequate to support it; and from the hydrodynamic modeling, which, as described, is incorrect in many regards.

Now, regarding the intake structures as illustrated in the new specs provided as Figure 6.2-4, the general layout and approach look good. However, unless the local dispersion rate were very large (which it isn't) in the vicinity of the adjacent canal where the screened organisms are to be deposited, it would appear that all passive organisms there would eventually be re-entrained on the screen, by virture of the configuration of the intake grain from Fishhook Spoil (Fig. 6.2-3). We accept the screen-trapping and transport system outlined by TECO as being promising and likely very effective, but it also seems obvious that the entrained organisms MUST be disposed of well away from the intake channel and in dilute enough quantities so that predators are not attracted to the POD. A dye test in the proposed disposal canal would indicate what the re-entrainment rate is.

The current and proposed discharges just do not seem to be hydraulically optimal. A discharge alternative placed farther offshore, and preferably in a multiport format, should be investigated. We surmise the current discharge system leads to poor mixing rates, a tendency to hug the shore, and high re-entrainment rates. We would like to see some field data on the characteristics of the present plume.

The near shore model results (in plan), as presented, cannot show any change in plume behavior following dredging work by Corps (Note S. Palmer). [no $\partial * / \partial \phi$ variation!]

We would also like to see more field data on the vertical behavior of the plume, on a transient basis, to determine the validity of the data presented as Tables 6.2-1-3. This can then be compared to transient mortality data, such as 0.74°C/hr TLm presented for oyster in Table A.6.1, Appendix 6, to determine the true extent of benthic impact area.

Section 7

A major pivot of the conclusion of no significant biological impact is the population modeling. Unfortunately, the population modeling, as presented in Section 7, appears to be deficient or simplistic in several regards; including:

1) natural mortality is not differentiated from conditional plant mortality

2) density dependence and growth compensation are ignored

3) the effects of the lost organisms to their predators are not analysed

4) the mathematical model presented is somewhat trivial.

First it is assumed that equilibrium populations exist both before and after the plant for each species. Are all RIS's in equilibrium? Is the manatee? Do oysters require 2 breeding adults, being hermaphrodites? The data in §4 show stage-dependent mortality. These are only grossly approximate in this model.

No charts or tables telling what E and S values were used, or whence they came, could be found in the Demonstration. What are they?

The mathematical formulations to arrive at eqn. 7.1-4 are not that difficult. Regard eqn. 7.1-5

$$Na = S_1 * N_1 + S_e * N_e \qquad 7.1\text{-}5$$

but, from 7.1-3

$$Na = S_1 * N_1 + E * S_1 * N_e$$

By definition $Na = Se\ Ne$

Hence equation 7-15 is not a development from eqn. 7.1-1, but merely a restatement. To solve the problem one needs to know Ne, F, E, and S_1. These are related by equation 7.1-4, in part, so that either Ne or F can be neglected. At best, then, this model will predict Na from Ne, or vice versa. Changes in population structure, or relative species sizes and diversity, cannot be found. Neither can transient long-term shifts. EPRI (op. cit.) notes: Thermal power plants normally operate on a near continuous basis, particularly at multi-unit sites, with an expected life span on the order of 40 years. The effects of cropping, therefore, will be experienced by fish and major invertebrate populations on a continuing basis. When estimated short-term effects are small, an inference is generally made that the long-term effects will also be small. This reasoning is sound while the effects are very small, however, at moderate to high levels of cropping the annual loss could change overall population levels or other characteristics of the population. Because fish and major invertebrate species may have long generation times, the response of a population to continuous cropping may not be apparent for years, and many additional years may pass before the population stabilizes with respect to intake cropping.

Another assumption is that populations are uniform throughout the bay, and not local or concentrated near the shore. Comparisons are made on the basis of proportion of total area, or proportion of total volume. The validity of such analyses is not entirely self-evident. Another aspect is the ratio of intake mortality to internal generation and boundary fluxes. If no density effects are assumed (and they are not), then the changes induced by plant mortality cannot be made up by higher internal source generation. If equilibrium populations of the same level are to exist, then boundary fluxes must be higher to compensate. These aspects are not discussed.

Dispersive fluxes are mentioned in paragraph 1 of p. 7.1-5. It was stated last fall that we do not readily comprehend the validity of this argument. We requested an explanation. In point 6 of his letter of Sept 16, 1980, Dr. Johnson again reiterated it was so, but no proof was given. We may just have clouded vision on this argument, but we would still like a rigorous proof of this argument (i.e. mathematical). The validity of both the heat effect and population analyses depends upon it. It is not entirely self-evident to us that a higher dispersive flux would not result in greater mass transport rates from the discharge to the inlet in the absence of significant net advection.

Similarly, the argument regarding areas of reduced concentration stated in paragraph 4 ("The base case...") of page 7.1-5 is also not self-evident. Figure 7.1-1 is missing from our Demonstration, so this may be the cause of the problem. The areas of influence of entrainment, depicted in Figures 7.1-1 thru 4, certainly do not appear small or insignificant with respect to the areal extent of Tampa Bay.

We are very confused by the statement near the top of p. 7.1-6; viz.:

> The area of influence is affected by the spatial pattern of concentration with the steeper gradients having smaller areas of influence.

This is not evident in the data presented; kindly illustrate it more clearly. Further, it usually follows that effects are proportional to gradients in all environmental engineering work. Kindly demonstrate rigorously why the impact of * would be inversely proportional to the $\partial * / \partial x_i$. From our standpoint, a change in * will result in either time or space having an impact. Usually, the greater the change in *, the greater the impact, i.e.,

$$d(\text{IMPACT}) = \varphi(d(*)) \qquad \underline{1}$$

now for changes with respect to space

$$\frac{\partial *}{\partial x} \Rightarrow \frac{\partial *}{\partial x} \Delta x \doteq \partial *$$

$\partial *$ will occur in a timescale proportional for the characteristic velocity--

$$\frac{\partial *}{\partial x} \cdot U = \frac{\partial *}{\partial x} \frac{\Delta x}{\Delta t} \doteq \frac{\partial *}{\partial t}$$

FOR Δt = CONSTANT THEN $\frac{\partial *}{\partial t} \Delta t = \frac{\partial *}{\partial x} \Delta x$

$\underline{2}$

i.e. $\partial * \eqsim \frac{\partial *}{\partial x}$ AND NOT $\partial * \eqsim \left(\frac{\partial *}{\partial x}\right)^{-1}$ $\underline{3}$

Kindly point out why equation 3 is valid, as alleged on p. 7.1-6. Further on p. 7.1-6 the comment is made

> Additional information needed to apply this method is the mean density of each species life stage.

Why is density information needed here, yet assumed to be irrelevant following eqn. 7.1-5 on p. 7.1-3?

The equation presented on p. 7.1-7 is poorly developed and not clear. Would not the number entrained be equal to

No. = Density * Volume * (length of spawning period or other presence indicator)?

Since (Table 7.1-7) the duration of life stages (1-6 days) is less than the sampling interval (2 weeks), the quotient on the rhs of the equation on p. 7.1-7 could not reasonably provide the proper timescale. What you want is the quotient of the duration of the season of presence divided by the duration of the life stage to the -1 power times the number of such time units per annum.

The cumulative impact, p. 7.1-8, should include evaluation of other losses due to other plants, water pollution, dredging, etc.

Section 7.2

Comments about our skepticism of this thermal modeling have already been made. It follows we do not accept conclusions based on them.

In § 7.2.1.1. the comment appears:

> While a small portion of the larvae in the Bay will be killed by entrainment, this loss is unlikely to adversely affect the Tampa Bay oyster population.

Such unproven comments are of no value. Prove it! As noted previously, on p. 7.4-1 it states

> the station's effect on aquatic population is not adverse

yet on p. 7.2-4 it states that 5,275 adult shrimp will be lost, and 98,000 will be impinged. Similar data are given in § 7.2 for other RIS's. How can these not be adverse?

Arguments about proportional areas are also not convincing unless it can be shown that distributions are uniform. If macrophytes are nonuniformly distributed, then is it not likely that many fish are also?

Note on p. 7.2-7 that

> molting larvae are intolerant of sudden fluctuations of temperature and salinity.

Would this not occur at the edge of the plume? Has this been factored into the mortality rate?

Note that explicit data for natural vs. plant-induced mortality are not given here.

Section 7.3

Benthic effects depend upon the area the plume touches the bottom to a large degree. We have stated some reservations to these predictions in an earlier review. Calibration with field data for the current plume distribution is required.

P. 7.3-2, 2nd last paragraph, ("In summary...") indicates better mesofield modeling and data are required to evaluate benthic effects there. This is the area where the significant impacts will occur.

The linear model presented on p. 7.3-4 is not developed or justified. Why is a linear model valid? Are the relationships linear? Why should a "quadratic effect of sediment grain size" have a linear effect? What meaning do the numbers in Table 7.3-1 have if the relationships are not linear? Should environmental impact be based on linear concepts; ARE natural systems approximately linear?

The conclusions reached in § 7.3.3 depend on the near-field model results, which are uncalculated, and which therefore cannot be substantiated or accepted.

Section 7.4 Fine Mesh Screening

Note that

1. It is accepted herein that the screen works.
2. It is stated that the survival is life-stage dependent, but values are not given.
3. It is stated that the effect on aquatic populations is not adverse, although data show it is.

Hence, the Sierra Club does not concur that utilization of the fine mesh screening is not warranted. It recommends

1. the screening be utilized
2. the organisms be discharged far from the intake area
3. the dilution pump be turned off, or similarly screened
4. if the dilution pump is turned off, then alternative discharge configurations affording better mixing be investigated.

The sentence at the bottom of p. 7.4-1 is a sleeper. The methods and data presented do not justify this conclusion, in our opinion.

Section 8

No comment, would be redundant. The hydrodynamic and population modeling upon which these conclusions are based, are of dubious validity. The overall concept is logical, though.

Recommendations

1. the nearshore model be rechecked, and calibrated and compared with field data
2. a fine-grid far-field model be developed to simulate the mesofield
3. dye tests be undertaken to determine re-entrainment from the discharge, and entrainment from the canal where the screen organisms are to be dumped
4. intratidal samples be taken near the edge of the plume
5. the 3-D extent of the plume be measured in the field over tidal cycles
6. the fine screen mesh program be continued
7. population modeling be based on density effects, and energy flux considerations for effects of killed larvae

8. separate modeling and toxic analysis of biocides be made.

It is our opinion that the approach is conceptually correct. The Demonstration, as presented, is still not convincing, however.

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Comments on Possibly Toxic Wastes in Amendments 3 and 4

1. Surface Discharges

In the response to Question 3 in Amendment 4, it is noted that blowdown (and FGD bleed) streams will ultimately be placed in the discharge channel. This is admittedly a better disposal mechanism than routing to Jackson Creek. Further in 5.2.1.1. of Amendment 3 a possible variance option is requested. In 5.2.1.4. only a qualitative expectation that blowdown will not have a significant effect is offered.

As noted in previous applications, we have never considered it wise to underestimate the effects of dissolved toxics upon aquatic environments. While modeling for thermal discharges has been described, the mixing zone characteristics for the blowdown are poorly covered, as are any convincing demonstrations that these streams will have no effect upon the aquatic environment after mixture. Could a lethal dose toxicity test be performed on RIS's and macrophytes found near the plant at ambient temperatures to ensure there will be no effects?

2. Groundwater Discharges

Most of the groundwater conclusions depend upon assumptions about the coal, ash, and FGD content. These cannot be checked until the system is in operation. Therefore, we recommend close scrutiny of monitoring wells by the DER after the system is in operation to ensure these assumptions prove correct.

SIERRA CLUB
FLORIDA CHAPTER

1601 NW 35 Way
Gainesville, FL 32605

February 14, 1981

Mr. H.S. Oven, Jr.
Power Plant Siting Administrator
Dept. of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32304

Dear Buck:

On November 10, 1980, we sent some handwritten comments to you from our consultant Mr. D.S. graham on the TECO Big Bend 4 316 Demonstration. These comments have now been typed and we have enclosed this copy for you. Please add them to our previous comments. Thank you.

Sincerely,

Barney L. Capehart
Power Plant Siting Committee
Chairman

cc: Mr. John Hamill, TECO
Mr. H. Zeller, EPA
Mr. S. McCarter, Tampa Group Sierra Club

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REVIEW OF AMENDMENT 5 TO TECO 316 DEMONSTRATION REGARDING HYDRODYNAMIC MODELING

- SIERRA CLUB -

I. Introduction

Briefly, the Sierra Club submitted a response to the draft TECO 316 Application in which certain critical comments were made of techniques used in the hydrodynamic modeling of Tampa Bay. These were further expounded on at a meeting at TECO Headquarters, in Tampa, on November, 1979.

Responses to these comments have included letters from Dr. Johnson of TECO, of August 11th and September 16, 1980, and issuance of an Appendix 5 to the Demonstration.

These materials are reviewed herein. The Sierra Club appreciates the opportunity to comment on these studies and hopes its efforts will assist in the regulating and licensing procedures.

II. General Comments

Relatively minor changes have been made with respect to the modeling efforts originally described by TECO. The near-field model has been changed to more accurately simulate a high-Richardson-number environment, and this is laudable. The model used is still steady-state and neglects certain important dispersive terms.

Some changes appear to have been made in the far-field modeling, but the instability problems inherent in the grid still appear to plague the model. While the method of computation is unclear, the net advective flux problem appears to have been corrected. The large eddy viscosity coefficients required to obtain numerical stability still render some results dubious, in our opinion.

This review has been made difficult by non-standard symbols and nomenclature, and unwarranted changes in both notation and coordinate systems. This will be discussed anon.

III. Near-Field Modeling

This material refers to Section 4.5.1 of Appendix 5 of the TECO 316 Application.

First, we are pleased that the near-field model was altered to better simulate appropriate Richardson-dominated dynamics. Comments will be made, to the extent possible, in the order of the text.

1. The reference to Lean and Willock (1965), on p. A.5.1.-1 is an obscure publication. We cannot judge its validity until we are able to locate a copy.
2. The slack tide assumption (p. A.5.1.-2) renders the model steady-state. Tidal conditions are inherently non-steady; therefore, a lot of inform-

ation is lost in the averaging. Use of a steady-state model must be justified on the basis of what the model is being used for. Presumably, it should be demonstrated that the intratidal variations in heat at a point in the near-field do not affect the biota. Since we surmise that intratidal variations will exceed non-tidal variations in this region of strong thermal gradients, the validity of this assumption is not completely self-evident to us. Finally, averaging over a tidal cycle (or neglecting it) will induce rather large "apparent" dispersive fluxes. As will be shown presently, these are not in the model.

3. The radial flow assumption implies no flow separation. This assumption is usually valid for intakes, but not for discharges.

4. A constant heat loss rate (if conservative) is reasonable. It is not in equation A.5.1.-4, however.

5. The use of y as the vertical coordinate (presumably) in equation A.5.1.-1 is non-standard to oceanography. Also, note that both mathematical symbols and coordinate systems are completely different in equations A.5.1.-1 and A.5.2.-1. This may be an attempt to confuse -- at least, it is highly unprofessional.

6. Regarding equations A.5.1.-1 and A.5.1.-2, it is not entirely clear what makes the water move. p must vary with either time or space. If conditions are "steady" then

$$p = \rho g H \qquad 1.$$

where H is the depth, hence

$$\frac{\partial p}{\partial x} = g \frac{\partial}{\partial x}(\rho H) \qquad 2.$$

Also $$\frac{\partial p}{\partial y} = g \rho(y) \qquad 3.$$

Does ρ vary with z and y in the model, presumably as $\rho(T)$? If not, the water will not move due to the steady-state assumption ($\partial^2 H/\partial t^2 = 0$). Also, it is likely that near the critical flow section

$$g \bar{H} \frac{\partial \rho}{\partial x} \approx \left[\frac{\partial H}{\partial x} \right] g \bar{\rho} \qquad 4.$$

hence, the dynamics must also include terms like

$$g \bar{H} \frac{\partial}{\partial x} \int_0^H \rho(y)\, dy \qquad 5.$$

This is not made clear in equation A.5.1.-2, but does appear to be in equation A.5.1.-6.

7. Regarding equation A.5.1.-2, the term $U_x \partial U_x/\partial y$ has been included in spite of the fact it is likely small; while $\partial U_x/\partial t$ WHICH is not necessarily small, has been neglected. The nature of the term $\partial p/\partial x$ is not outlined, nor is the value of the normalizing parameter. Is $\rho = \frac{1}{H}\int_0^H \rho(y)\,dy$? Is

$$\frac{\partial P}{\partial x} = g\,\frac{1}{T}\int_0^T H(t)\,dt * \frac{1}{H}\int_0^H \rho(y)\,dy \;? \qquad 6.$$

Finally, note that equation A.5.1.2 is incorrect insofar as $\partial \tau_{xy}/\partial y$ should be used.

8. Regarding equation A.5.1.-3, the mass conservation equation shown is correct, providing ρ is constant. It has been shown that $\rho(x,y)$ for equation A.5.1.2 to be meaningful. Hence, equation A.5.1.-3 is deficient.

9. This heat conservation equation is quite incorrect. Surprisingly, a correct form of this equation is given as equation A.5.2.-8 in the next section. In terms of this coordinate system a correct form of equation A.5.1.-4 is given as

$$\frac{\partial T}{\partial t} + U_x\frac{\partial T}{\partial x} + V\frac{\partial T}{\partial y} = K_1\frac{\partial^2 T}{\partial x^2} + K_2\frac{\partial^2 T}{\partial y^2} + S_i - S_o \qquad 7.$$

where S_i sources

S_o sinks -

The effect of averaging over a tidal cycle is to make $\partial T/\partial t = 0$, and make $\bar{U}_x = \frac{1}{T}\int_0^T U_x dt$ much smaller. These reductions are reflected in an increase in K_i, usually. Note that in equation A.5.1.-4 all the source, sink, and mixing terms are missing. In the assumption it is stated that there is a "steady-state source flow" $[S_i]$, and "constant heat loss rate" $[S_o]$. These are not in equation A.5.1.-4. Further, since dispersive transport is not included in this equation (yet is large by virtue of the temporal averaging), the transport relations are likely to be quite erroneous.

10. Continuing, note that equation A.5.1.-9, which is supposed to be just an integrated form of equation A.5.1.-4, does contain a sink term! Hence, they are not the same at all. Further, a second sink results from entrainment:

$$\frac{\partial}{\partial x}\left(\Delta T\, U_1 h_1\right) = -\frac{K}{\rho}\,\frac{\Delta T}{C_p} \qquad 8.$$

$$U_1 h_1 \frac{\partial \Delta T}{\partial x} + \Delta T \frac{\partial}{\partial x}\left(U_1 h_1\right) = -\frac{K}{\rho}\,\frac{\Delta T}{C_p} \qquad 9.$$

$$U_1 h_1 \frac{\partial \Delta T}{\partial x} + u_e \Delta T = -\frac{K \Delta T}{\rho C_p}$$

from equation A.5.1.-7. Then

$$U_1 h_1 \frac{\partial \Delta T}{\partial x} = -\frac{K \Delta T}{\rho C_p} - u_e \Delta T \qquad 10.$$

Recall $$U_x \frac{\partial T}{\partial x} + v \frac{\partial T}{\partial y} = 0 \qquad 11.$$

(Equation A.5.1.-4.)

It is easy to see in this format that equation A.5.1.-9 is not derived from eqn A.5.1.-4. Further, note that the heat flux in the term

$$-\frac{u_c}{h_1} \Delta T$$

in equation 11 appears to depend on the temperature difference between the atmosphere and the upper layer, rather than between the two layers of water.

11. Returning to eqns. A.5.1.-5 through A.5.1.-8, these are, similarly, not equivalent to equation A.5.1.-2. The equations appear to have been vertically integrated within each layer. Since the tide essentially varies as

$$H = H_0 \sin \omega t + \overline{H} \qquad 12.$$

so that H(x) = $\overline{H}$ (x) after averaging over a tidal cycle, it is not at all clear what the relative value of the term

$$-h_1 g \frac{\partial H}{\partial x}$$

is with respect to the baroclinic term

$$\frac{h_1^2}{2} \frac{\partial}{\partial x} g'.$$

If

$$h_1 g \frac{\partial H}{\partial x} = S_n \left(\frac{h_1^2}{2} \frac{\partial}{\partial x} g' \right) \qquad 13.$$

then the momentum and heat equations cannot be run separately, as will be shown presently. In this case an incorrect application has been made. These velocities must be driven in part by $\partial g'(x)/\partial x$ yet no data showing $p(x,y)$ ~~is~~ are presented.

12. Similar comments can be made for the radial flow case. Compared to baroclinic pressure gradients far from the source, what is the relative value of $-h_1 g \frac{\partial H}{\partial r}$?

Also, why has it been assumed that $\partial T/\partial \varphi$, $\partial U_1/\partial \varphi$, $\partial U_2/\partial \varphi$, etc. can be neglected? I.e., why is there no azimuthal variation? No data to substantiate this assumption are included.

13. In Paragraph 1, p. A.5.1.-5, the terms u_1, u_2 are previously undefined; and are presumably U_1, U_2.

14. As noted earlier, the reference to Lean And Willock is obscure.

Equation A.5.1.-10 can be transposed to

$$\frac{U_e}{U_1 - U_2} = \frac{\text{const}}{\mathbb{R}_i^2} \qquad 14.$$

where

$$\mathbb{R}_i \, \mathbb{F}_d^2 - 1 \qquad 15.$$

Not having the reference quoted available, it is noted that the exponent of Ri for several studies has varied between -1 and -1.5. (Turner, Buoyancy Effects In Fluids, 1973).

15. Referring to equation A.5.1.-2, V is the vertical velocity. The definition for the densimetric Froude number provided is

$$F \equiv \mathbb{F}_d = \frac{V}{\sqrt{\frac{\Delta\rho}{\rho} g h}} \qquad 16.$$

where h is previously undefined. This equation would lead to erroneous results in the model, particularly after vertical averaging has removed V (equation A.5.1.-5). It is proposed that the model should use

$$\mathbb{F}_d = \frac{U_1}{\sqrt{\frac{\rho_2-\rho_1}{\frac{1}{2}(\rho_1+\rho_2)} g h_1}} \qquad 17.$$

16. Since

$$\Delta\rho = \rho_c - \rho \qquad 18.$$

It appears that ρ refers to the density of the warm water. This has been used to normalize g' in

$$g' = g\frac{\Delta\rho}{\rho} \qquad 19.$$

, above on p. A.5.1.-5. Usually, the ambient or a mean, is used for normalizing g' in these studies.

17. On p. A.5.1.-6, the reference to the laboratory flows cited is not given. Neither are data showing the densimetric Froude numbers in the canal. The applicability of the model and reference are not demonstrated, therefore,

18. A rather serious deficiency may lie in the comment "Equation A.5.1.-9 is solved independently after the parameters U_1, h_1 and T are known at finite intervals", p. A.5.1.-6. Note that equations A.5.1.-5 are driven by the terms

$$-\frac{h_1^2}{2}\frac{\partial g'}{\partial x} - h_1 g\frac{\partial H}{\partial x}$$

Now, it is hypothesized that, over the depth and over a tidal cycle,

$$h_1 g\frac{\partial H}{\partial x} \approx \frac{h_1^2}{2}\frac{\partial g'}{\partial x} \qquad 20.$$

so, h_1 and U_1 are driven by both terms.

Now,

$$g' = g\frac{\Delta\rho}{\rho} \qquad 21.$$

$$g' \approx \text{const.}\ \frac{\Delta T}{T} \qquad 22.$$

$$g' \doteq \text{const.}\ \frac{T_1 - T_2}{T_1} \qquad 23.$$

Hence, eqn A.5.1.-5 can be written

$$\frac{\partial U_1 h_1^2}{\partial x} = \frac{\text{const.}\, h_1^2}{2T_1}\left(\frac{\partial \Delta T}{\partial x}\right) - h_1 g \frac{\partial H}{\partial x} \qquad 24.$$

Recall $\rho C_p \frac{\partial}{\partial x}(\Delta T U_1 h_1) = -K\Delta T$ A.5.1.9

or $U_1 h_1 \frac{\partial}{\partial x} \Delta T = -\frac{K\Delta T}{\rho C_p} - U_e \Delta T$ 10.

It is patently obvious that equation A.5.1.-9 (or, equivalently, eqn. 10) cannot be solved independently of equation 24, because the output of equation A.5.1.-9, i.e., T(X) is needed to drive equation 24 (i.e., $\partial \Delta T/\partial x$ appears in both equations) if baroclinic pressure terms are important. No data are presented to indicate that they are not. Hence, equation A.5.1.-9 cannot be run independently of equation A.5.1.-5. The model is, therefore, likely inherently incorrect.

19x. It is surmised that equation A.5.1.-11 is a solution to equation 10 without the term $-U_e \Delta T$. (The problem of defining ΔT was mentioned in the text after eqn 10; this appears to be one way to obviate it). Note that U1 in equation A.5.1.-11 is undefined according to the list given below it in the text. Since $Q = Q_1 + Q_2$, presumably, equation A.5.1.-11 is incorrect.

A. Comments On The Field Calibration - Section A.5.1.-3.

1. Field data were not found in the Demonstration, nor were any supplied to us. Use of a model such as the one presented in Section A.5.1.-2 would be valid only for a clearly stratified flow which separated from the bottom within the discharge canal. The effects of tidal agitation tend to reduce stratification. Since tidal effects were removed from the model it needs to be clearly demonstrated that a strongly stratified flow, indeed, exists in the field.

2. There is obviously no atmospheric loss of dye, thus, the term K in equations A.5.1.-9, A.5.1.-9$'$, A.5.1.-11, and A.5.1.-11$'$ equals 0. Hence, the most that can be done with these data is to find U_e. However, it is shown earlier in equation 11 that U_e is keyed to temperature differences between the upper layer and the atmosphere, and not the differences between the temperatures of the two water layers in the model through the term $-\frac{U_e}{h_1}\Delta T$.

Hence, the dye tests cannot be used to calibrate equation 11. If equation 11 is in error, then dye data could be used to find U_e, but the results would be aliased by heat losses to the atmosphere which the dye measurements would not detect. This is probably one (of several) reasons why the model predicts higher temperatures than the field data in Figure A.5.1.-1, particularly in distant regions where atmospheric cooling is significant with respect to cumulative dilution by entrainment. Other causes of the large discrepancy could include neglect of dispersive miximg and transport, and lack of strongly stratified flow.

Finally, the discussion of "radial angles" is quite confusing. In a radial coordinate system the angular dependence (i.e., azimuthal) is completely separate from the radial dependence in these analyses. As noted previously, there is no azimuthal dependence given in equations A.5.1.-5' through A.5.1.-9'. Hence for this model to be valid

$$\partial U_1/\partial \phi = \partial U_2/\partial \phi = \partial T/\partial \phi = \ldots = 0$$

Thus, a "final angle ... of 61°" implies separated flow and angular dependence.

B. Summary Of The Near-Field Modeling

The near-field modeling can be criticized at several levels --

1. As presented, and assuming no typographical, or other errors, most of the equations are incorrect.
2. Assuming that there are some typographical and other errors, and giving reasonable benefits of doubt, the major problems with this model appear to be the removal of the tidal barotropic pressure and velocity terms, and assumption that the baroclinic pressure field can be generated independently of a temperature field simulation.
3. Field data to substantiate use of a 2-layer strongly stratified laterally-averaged model in the appropriate densimetric Froude range are missing.
4. Use of a conservative tracer to calibrate a non-conservative one.
5. (Expected) poor fit of model results to field data.

In conclusion, we are not prepared to accept the methodology and results of the near-field modeling as presented.

IV. Far-Field Modeling

A. General Comments

Some adjustments have been made of the far-field modeling in response to our comments. However, the basis of the approach is essentially unchanged.

B. Comments On Section A.5.2.1.2. (Appendix 5)

As was noted in the near-field modeling section, the coordinate system and symbols are completely different in Section A.5.2. than in Section A.5.1. Unless the procedure is a somewhat transparent effort to confuse, this change appears unnecessary to us.

The equations A.5.2.-1 through 7 are essentially correct, in some contrast to the previous Section. Not all terms are defined, p^s for instance, and we are somewhat dubious that it was included in the calculations), and the terms h and η are somewhat incorrectly defined. Nonetheless, the validity of the equations and of the model for Tampa Bay is accepted.

C. Comments On Section A.5.2.1.3.

Our objections to the grid outlined in Figure A.5.2.-1 were outlined in previous reports. For hydrodynamic simulations it is probably adequate for gross circulation simulations of Tampa Bay, with the exception of Old Tampa Bay where the normal boundaries exerted by the causeways are missing. In our meeting last November we agreed that the grid would suffice if net advection were essentially zero in the Bay, and if the tide at the Weedon Island area were approximately correct.

The goals of the model CAFE-1 are made more explicit in Section A.5.2.1.3. The references to Wang (1978) are correct, but somewhat inapplicable. The point we tried to make in our previous discussions is that somewhat more stringent requirements are placed upon grid geometry if CAFE-1 -- DISPER-1 are to be run together, than if CAFE-1 is to be run alone. These hinge on stability and will be reiterated anon.

Since the goal, admittedly, is dispersion modeling, an appropriate reference is Wang, et al. (1978)[1] in which inset grids were used in conjunction with CAFE-1 for DISPER-1 modeling, as we recommended. The scale of the insets was considerably less than a kilometer.

---

[1] Wang, J. D., et al. Canal Discharges Into South Biscayne Bay, Rosenthiel School Of Marine And Atmospheric Science, University Of Miami, Miami, Florida, February 28, 1978.

With regard to Dr. Johnson's letter of September 16, 1980 (quoted below for convenience), some comment is made.

> "1. Check the implications of the net flux calculations.
>
> This item arose as a point of discussion because Figure 11A in the Prospectus indicated substantial net velocities out of the mouth of Tampa Bay. This was due to the method by which the net velocities were calculated, i.e., by averaging velocities through the tidal cycle. Net velocity at a point is recomputed by a) averaging fluxes throughout the tidal cycle to obtain the net flux, and b) dividing the net flux by the average water depth. Net velocities computed by this method are shown in Figure 1 and are presented in Section 3.1.4 of the 316 Demonstration. Figure 1 shows that there are no large net velocities into or out of the Bay".

Since existence of net advective fluxes into and out of a Bay with no appreciable river inflows indicates the impossible situation of creation of mass, and since they would greatly affect net transport, we were concerned about the net advective fluxes in the original report. Several points of interest still linger, in view of the above quotation. First, in reference to the definition of q_x, q_y on p. A.5.2.-3 and above, it is essential that the consultant realize that the q_i's are unit discharges, or perhaps, unit advective fluxes. Since the net advective flux into Tampa Bay is close to zero, most transport, therefore, accrues across the open boundary and into the Bay by dispersive fluxes. (This is the essential reason we do not accept as evident the contention that large values of the dispersion coefficient are conservative -- but more on this anon). Some depth-aliasing will result if velocities, rather than unit discharges, are used in CAFE-1 to compute tidal net values, but these are not usually large.

Of more concern to us is the use of the averaging procedure itself to determine a net advective flux. The wording in the quotation above tends to imply the algorithm (see next page) was used to find the "average fluxes". Actually, there is no need to average at all to find a net flux -- a simple vector sum is appropriate; viz:

$$\vec{q} = \sum_{i=1}^{n} (q_i + q_j) \qquad 2.$$

where q_i, q_j are unit discharges in the x,y directions, respectively, and overbars imply net quantities, as defined.

Figure 1 in the quotation above presumably refers to Figure 3.1.-6 in the Demonstration. While the magnitudes of the flows are questionable in light of the differences between equations 1 and 2, the general pattern of the circulation appears reasonable, with the exception of Old Tampa Bay, of course.

D. Comments On Section A.5.2.1.4.

Problems in calibration and verification were raised previously. These are addressed in Section A.5.2.1.4,

$$\bar{q} = \overline{q_i} + \overline{q_j} = \frac{1}{N}\sum_{m=1}^{N}(q_i)_m + \frac{1}{N}\sum_{m=1}^{N}(q_j)_m \qquad 1.$$

and in a portion of Dr. Johnson's letter of September 16th. (Included below for convenience).

> "2. Try to improve the current prediction near Weedon Island.
>
> The comparison of velocities between the CAFE model predictions and the USGS field data as presented in the Prospectus (October, 1979, Table 1) was acceptable at all locations except at Weedon Island. This comparison has been improved by adjustment of the bottom friction coefficient so that only a 0.01 m/sec difference exists between model and field results at Weedon Island. The complete calibration process for the model is discussed in Section A.5.2.1.4 of Appendix 5 in the 316 Demonstration."
>
> "7. Justify the use of eddy coefficients of 500 m^2/sec.
>
> The eddy viscosity parameter cannot be interpreted wholly in a physical sense and is primarily useful as a stabilizing influence for the numerical computation. This was confirmed by consultation with those responsible for the model and by a sensitivity study in which the value of the eddy viscosity coefficient was varied. With an eddy viscosity of $50_m{}^2$/sec, the calculation was unstable.
>
> However, with an eddy viscosity of 200 m^2/sec, the solution was stable and the results obtained were identical to those obtained with an eddy viscosity of 500 ^{2}/sec."

It may be recalled that we were particularly concerned about poor agreement in tidal phases, and surmised that this might be due to large eddy viscosity coefficients, particularly in view of the fact that the coarseness of the grid tended to suggest that large eddy viscosity values would be needed to make it stable. The values of the eddy viscosities used were not given in the initial Demonstration draft, but we were told in our meeting of last November that values of 500 m^2/s had been used. Since turbulence theory tends to require that the dispersion and the eddy viscosity coefficients should be about the same size, and since the eddy viscosity tends to affect tidal phases, we felt that a great deal had been sacrificed in order to stabilize the grid, and suggested that another be developed.

The data presented in Table A.5.2.-1 tend to show good agreement with the USGS data and poor agreement with the Aquatec data, particularly in the area of interest near Big Bend. Certainly, the Weedon Island problem appears to be solved. Phase information is not provided in this Table, however, and this is fully half the solution to the wave equation, as well as being the portion that gave us the most concern previously. In light of the high eddy viscosity coefficients used, we cannot pass an opinion on the validity of the model calibration until phase information is presented.

With respect to the comments regarding the sensitivity study in Section 9 of Dr. Johnson's letter, the conclusion seems credible, although the results of the sensitivity test are not given. However, it would be more germane to compare coefficients in the order of magnitude of the dispersion coefficients (8-30 m^2/s vs. 200-500 m^2/s).

E. Comments On Section A.5.2.2.2. (DISPER-1).

Equation A.5.2.-8 is correctly stated, in contrast to equation A.5.1.-4. Note that this equation is linear in C, has arbitrary values of dispersion coefficients (unlike the eddy viscosities which can be roughly estimated by shear terms in the momentum equations and subgrid eddy-scale theories), and that a non-conservative gradient sink term for temperature is not included (if C = T). One was apparently devised, however.

Usually, in referring to CAFE-DISPER, Eij are used for eddy viscosities, and Dij for dispersion coefficients (in contrast to equations A.5.2.-9, 10). We will use this notation here to avoid confusion.

Finally, note that yet another set of mathematical symbols is used in equation A.5.2.-8 than in equation A.5.2.-1. The need for such frequent changes is certainly not evident to us.

F. Comments On Section A.5.2.2.3.

1. Regarding the so-called isometric coefficients, it can be seen by substituting equations A.5.2.-9 and 10 into equation A.5.2.-8, and reversing the order of differentiation, that the best values for an isometric diffusion matrix are $E_{xy} = E_{yx} = \frac{1}{2} E_{xx} = \frac{1}{2} E_{yy}$.

2. We have been through the issue of appropriate dispersion coefficients before, particularly in our recent negotiations with Seminole regarding the modeling of the St. Johns River. In general, it was decided that turbulence theories require that the turbulent Schmidt number be of first order at least, and preferably between 1 and 2. For the same grid, this would require

$$\frac{Eii}{Dii} = 1 \text{ to } 2 \qquad 1.$$

(Further, as a result of the Seminole negotiations a procedure for determination of appropriate minimum dispersion conditions was proposed[1.]).

Now, a grid also inherently involves spatial integration transversely, so a so-called S.G.S. eddy coefficient must be used which accounts for some transverse dispersion, in addition to Taylor-Elder dispersion. Hence, Eii and Dii can be larger than the turbulent eddy viscosity and diffusivity. However, they should not be much larger if real-time advection is maintained.

[1.] Graham, D.S., 'Appropriate Minimum Dispersion Criteria For Tidal Rivers:, Proc. of ASCE Hydraulics And Energy Div. Spec. Conf. On Conservation And Utilization Of Energy Resources, Aug. 8-11, 1979, San Francisco, CA, pp. 130-137.

(again, the comments regarding the near-field model are germane). Finally, the grid should not be much coarser than 1/2 to 1/3 times the characteristic lenghscale of the phenomenon being studied, in this case, a thermal plume.

Accepting, as we surmised, a real dispersion coefficient of about 1 - 5 m^2/s, (actually 8 m^2 /s it appears), plus an SGS increment of perhaps 10-20 m^2/s for a grid as coarse as Figure A.5.2.-1, a value of Dii of 20-40 m^2/s might be appropriate for this grid scale. (An inset grid which would be stable at 5-10 m^2/s would be preferable).. Hence, we are not surprised by point No. 6 in Dr. Johnson's letter (below)[1] that the grid was marginally stable at 30 m^2/s and unstable at 8 m^2/s. Indeed, a 30 m^2/s is likely an appropriate value for the grid being used.

---

[1] "6. If we elect to use a higher dispersion coefficient than is justified by the dye survey, demonstrate that the results are conservative.

The dispersion coefficient value used in the thermal discharge study was 8 m^2/sec, the same value obtained in the field calibration. For the meroplankton entrainment study, a higher dispersion coefficient of 30 m^2/sec was used in order to improve numerical stability. This value was conservative because a higher dispersion coefficient will result in a greater degree of entrainment of meroplankton."

Our objections concerned the following:

a) that

$$\frac{Eii}{Dii} = \frac{500}{30} = 16.\dot{6} \gg 1 \qquad 2.$$

which leads us to surmise that the advective inputs to equation A.5.2.-8 are wrong.

b) That the lengthscale of the grid was longer than the phenomena being studied, so that their characteristics would be aliased, and

c) That the two models (near-field and farfield) would be difficult to link.

We still have these reservations.

Further, no comparisons of DISPER-1 calibration on verification output are given in either the Demonstration, Appendix 5, or Dr. Johnson's letters.

Finally, referring, again, to Point 6 of Dr. Johnson's letter, it is not demonstrated that use of high dispersion coefficients is conservative. A demonstration would consist of an analytic proof, or comparisons of computer simulations with different values of Dii. We can point out that the concentrations of any constituent are dependent upon the advective and dispersive fluxes. Figure 3.1.-6 shows net advection; the net advective fluxes appear to be small. Hence, the transport in Tampa Bay is large dependent upon dispersive fluxes. These are increased by raising Dii. Impact would be proportional to

$$-D_{ij}\frac{\partial^2 c}{\partial x_j \partial x_i}$$

and hence, $\partial^2 c/\partial x_i \partial x_j$ for Dij = constant. Greater mixing and transport would tend to reduce $\partial c/\partial x_i$, and hence, $\partial^2 c/\partial x_i \partial x_j$, thereby increasing impact.

G. Comments On Section A.5.2.2.4.

1. No model results are provided; hence, no opinion can be offered.

2. We are surprised that the model was stable for thermal simulations at 8 m^2/s, but not stable at this level for meroplankton simulations.

3. Charcteristics in the area of impact where the near-field and far-field models meet is not clear. Both models tend to be most accurate in regions of lesser interest -- i.e., the middle of the Bay or well within the mixing zone. The zone of major

incremental impact is the adjacent portion of Hillsborough Bay. An inset grid for dispersion studies would be helpful here.

4. It is not made explicitly clear how a knowledge of circulation and mixing processes was tied to biological response. (Point 4 of Dr. Johnson's letter). This will be discussed in a separate review.

H. Summary Of Far-Field Modeling

The problem with the net advective fluxes appears to have been solved, as has tidal amplitudes near Weedon Island. Otherwise, the majority of our comments about the deficiencies of the far-field study is still applicable. Specifically, we recommend detailed dispersion modeling near the plant discharge and relating the results to biological response.

SIERRA CLUB
FLORIDA CHAPTER

1601 NW 35 Way
Gaineville, FL 32605
March 28, 1981

Mr. H.S. Oven, Jr.
Power Plant Siting Administrator
Dept. of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32301

Dear Buck:

Enclosed are the comments made by our consultant, Mr. D.S. Graham on Amendment 5 to the TECO application.

Yours truly,

Barney L. Capehart

Barney L. Capehart
Power Plant Siting Committee
Chairman

cc: Mr. John Ramill, TECO
Mr. H. Zeller, EPA
Ms. Laurie Rask, Tampa Group Sierra Club

SIERRA CLUB

COMMENTS ON AMENDMENT 5 OF THE TECO APPLICATION

by the Sierra Club

We are encouraged to see more detailed analyses of the fate of potentially toxic waste streams that may enter Tampa Bay. We had expressed concern about this previously. Some observations are made here with respect to the various responses by the Applicant in Amendment 5.

Question 1.

The reply to this question rests too heavily upon untested assumptions. Noting in the reply to question five that the velocities are quite low, the canal quite deep, and the length short, it is not immediately evident that complete mixture will occur. While this may be the case, some calculations to support this assumption would be helpful.

Question 2.

No comment.

Question 3.

These data are quite interesting. Evidently ambient conditions exceed FWQS and it is therefore not clear how increasing the level of excess, even slightly, will improve the situation. Nevertheless the proposed POD is likely the best, and certainly better than local streams or groundwater. Ambient water quality may very well preclude future plant siting on upper Tampa Bay.

The data presented presumably assume complete mixture to occur. As in question 1, this should be demonstrated with a few calculations or measurements. Further, heavy metals often tend to associate with sediments rather than mix freely within the water column. Is this likely here, and is there a problem with heavy metal concentration in the sediments near the discharge canal at present?

In general, the Applicant's proposed management of waste streams is well thought out and acceptable to us.

Questions 4-9.

No comment.

Question 10.

We have had some difficulty locating Table 5.2-4 of the SCA. It would be appreciated if this were provided, or if the calculations were shown. This again returns to the estimate of appropriate dispersion coefficients for the canal.

Since releases are for 2 hours, the utility of 96 hour LC_{50}'s is dubious.

Since the discharge is into saltwater, we would have no problem with a mixing zone for FAC provided it did not extend beyond the discharge canal.

c/o B. Capehart
Gainesville Chapt.
Sierra Club
July 23, 1981

Mr. Hamilton S. Oven, Jr.
Administrator, Power Plant Siting
Section
DER
Twin Towers Office Building
2600 Blair Stone Road
Tallahessee, FL 32301

Dear Mr. Oven:

Barney Capehart sent me replies from TECO regarding my comments on the Big Bend - Unit No. 4 316 Demonstration. I looked them over briefly a month or two ago, but have not had a chance to reply until now.

The Applicant has obviously endeavored to answer our queries to a reasonably detailed degree and at a technically appropriate level.

I have read thru the replies and examined them in detail. After doing so I do not see any need to go thru a step-by-step discussion once again. Any person familiar with this particular branch of science would be able to see the points we were trying to make and the degree to which the Applicant has addressed them. In general, I think most of our criticisims remain valid. These issues have now been raised and clarified, and I think that you, and the other regulators, now stand in a reasonably good position to make a decision. On the basis of the information presented we are not convinced that negligible environmental impact has been conclusively proven and would therefore encourage you to deny the Application for once - thru discharge to Tampa Bay at this time.

Thank you for the opportunity to have participated on this process.

Yours sincerely,

D. Steven Graham

D. S. Graham

DSG:1.35

1601 N.W. 35th Way
Gainesville, FL 32605
December 13, 1980

Honorable Robert Mann, Chairman
Florida Public Service Commission
Fletcher Building
Tallahassee, FL 32304

Dear Chairman Mann:

I will not be able to attend the PSC final need hearing for the TECO Big Bend 4 unit. However, I have a number of concerns that I would like to express, and I hope you will address these at the hearing.

S.B. 1052 Section 366.86 states that in making its determination of need, the PSC shall take into account "whether the proposed plant is the most cost effective alternative available." And additionally "The Commission shall also expressly consider the conservation measures taken by or reasonably available to the applicant or its members which might mitigate the need for the plant...."

Neither the TECO site certification application nor the PSC preliminary report of October 15 thoroughly identify or evaluate the conservation measures reasonably available to TECO. Without this identification and evaluation, there certainly cannot be a judgement that building the plant is the most cost-effective alternative. The alternatives considered, and quickly dismissed, are all central station generation alternatives. There is little realistic attempt to consider decentralized alternatives except for cogeneration. The TECO answers to the PSC interrogatories also fail to explore conservation and decentralized solar projects.

The logic behind looking at central station generation seems to be that if one single source of 400MW cannot be found, then there is no alternative to building the new plant. However, a combination of alternatives such as cogeneration, conservation and solar water heaters could very well be enough to replace the 400MW of coal capacity. Unless this combination or other combinations are given a fair examination, there is no reason to believe that building the 400MW coal plant is truly the most cost-effective alternative. In addition, the combination of cogeneration, conservation and solar water heaters could supply some fraction of the 400MW capacity at a more cost-effective investment level. This possibility has been ignored completely.

Building the 400MW coal plant is not the only way to reduce our dependence on imported (into Florida) oil. Cogeneration, conservation and solar water heaters have the same effect. Whether a KWH of oil generation is replaced by coal or eliminated because of increased energy use efficiency, the result is the same--that oil is not used. Therefore, the question should be--what is the most cost-effective investment for a utility to make to eliminate its dependence on oil?

Testimony during the Conservation Goals hearings absolutely proved that conservation programs in Florida, as well as other states, provide a less costly way to satisfy customer demands up to some level. Clearly, all power needs cannot be supplied by savings from more efficient uses. However, until we have implemented this less costly method, it makes no sense to go forward with a more costly program in total, or in part.

In particular, my revised testimony of October 20, 1980 for the Inter Agency Work Group described cost-effective programs involving replacing inefficient refrigerators and air conditioners with high efficiency models, and installing heat pumps and solar water heaters. To my knowledge, TECO has not examined such programs in light of satisfying part, or all, of the 400MW of the proposed Big Bend 4.

The legislative revisions to the Power Plant Siting Act contained in SB1052 speak clearly and forcefully to the requirement to evaluate all conservation programs reasonably available to the applicant. I believe TECO has failed to do this, and I implore you to require them to meet the intent and letter of this law.

Another matter of concern to me is the possible inequity to present ratepayers from a decision to build Big Bend 4 if found by the PSC to be the most cost-effective alternative. The economics of a cost-benefit decision do not address the question of who pays the cost versus who gets the benefits. Specifically, my concern is that present ratepayers may well end up paying significantly higher rates so that future customers can pay significantly lower rates. The fact that the total cost to both groups is lower if the plant is built should not be the sole deciding factor. Why should present customers pay more now, and in the future, so new customers can pay less? What is the equity and fairness of this decision? This is an example of disaggregated costs and benefits where the group that pays most of the cost (the present ratepayers) is different from the group (the new customers) that gets most of the benefits. If the project indeed has greater benefits than costs, there still must be some other decision made to allow for equity to present ratepayers. This decision must be to have a future reduction for present customers so that they do not subsidize new customers.

In the past there was no need to consider such a factor, since new power plants were less costly than old plants, and all customers benefitted from this expansion. However, our present situation is such that new power plants are far more costly than old plants, and all old customers are penalized by having to pay the costs of expansion. Again, equity requires that some rate structure change be initiated to prevent present customers from subsidizing new customers.

One possible rate structure change to eliminate the subsidy is to establish a "front end fee" or "capital facilities charge." This is already done for water and sewer services in areas of the state, and is an accepted method to charge new customers their fair share. A similar approach should not be difficult to implement for electric service. I'm sure there are also other acceptable rate structures which could be applied in this instance to accomplish customer equity.

I know there are many issues the PSC will consider when the final hearing takes place, and I hope that the questions I have raised will be thoroughly explored in the process.

Thank you for considering my input.

Sincerely,

Barney L Capehart

Barney L. Capehart

cc: Honorable Joseph Cresse
Honorable Gerald Gunter
Honorable John Marks
Honorable William Mayo
Mr. Joe Jenkins, PSC
Mr. Hamilton Oven, DER
Mr. Jack Shreve, Public Counsel
Mr. H. Zeller, EPA
Mr. H.L. Culbreath, TECO

SIERRA CLUB
FLORIDA CHAPTER

1601 NW 35 Way
Gainesville, FL 32605
February 1, 1981

Mr. Dario Dal Santo
EIS Branch
U.S. Environmental Protection Agency
345 Courtland St. NE
Atlanta, GA 30365

Dear Mr. Dal Santo:

Thank you very much for taking the time to discuss with me the requirements for the Draft EIS on Tampa Electric Company's Big Bend 4 Unit. I know you have many projects to work on and I appreciate your interest in my concerns. As I stressed in our telephone conversation, I am greatly disturbed to learn that the EPA has not included consideration of conservation and renewable sources as one of the alternatives to be analyzed in the EIS on TECO's Big Bend 4 Unit. This alternative should have been much more thorougly examined at the state level by the Florida Public Service Commission, but it was not. Therefore, it is critical that the EPA examination of alternatives include a rigorous analysis of the conservation/renewable sources alternative to power plant construction.

The failure of the Florida PSC to require TECO to fully study the alternative of conservation and use of renewable sources is very surprising since the FPSC has just finished a process of setting energy conservation goals for all state utilities. The Florida legislature passed a bill in 1980 which required the PSC to set goals for electric utilities which would reduce growth rates in the consumption and the weather sensitive peak use of electricity. The PSC goals adopted do measurably reduce these growth rates. The FPSC projected demand growth of an annual rate of 4.54 percent is to be reduced to 2.31 percent. The growth rate in energy consumption is expected to change from 4.45 percent to 2.8 percent.

In the process of setting these goals, the FPSC held public hearings to obtain evidence for selecting the goals. A representative of TVA testified regarding the costs and benefits of the various conservation and renewable source projects underway in the TVA region. A copy of that testimony is enclosed. In addition to numerous other witnesses, I testified in favor of much more stringent goals. A copy of my testimony and detailed calculations is enclosed. A great deal of relevant testimony was offered during these hearings and this information should be available in the FPSC hearing record. Another document of interest written by the FPSC is the first preliminary report on the need for the TECO Big Bend 4 Unit. This draft report stated that if the conservation goals were adopted as proposed the Big Bend 4 plant would not be needed. Although the final version of this preliminary report appears to hedge this conclusion with some additional economic information, in fact it merely indicates that coal generation is cheaper than oil generation and does not examine economic costs and benefits of conservation. A copy of the conclusion page from each report is enclosed.

The FPSC goals hearing record and EIS's on other projects show that there is adequate information to support conservation and the use of renewable sources as an alternative to building a new coal-fired power plant. In the Allen-Warner Valley Energy System EIS, conservation and renewable sources were recommended by EPA as the preferred alternative. With this wealth of information in existence, it is imperative that the EIS on TECO Big Bend 4 include a full evaluation of these alternatives. The CEQ guidelines for preparation of an EIS are very specific in terms of identifying and analyzing alternatives. 40 CFR § 1502.14 on Alternatives Including the Proposed Action states "This section is the heart of the environmental impact statement. ...In this section agencies shall: (a) Rigorously explore and objectively evaluate all reasonable alternatives... (c) Include reasonable alternatives not within the jurisdiction of the lead agency. ..." The CEQ regulations emphasize the identification and analysis of real alternatives, and stress that the EI analysis is to concentrate on alternatives, the heart of the process. In particular, the CEQ comments on the regulations emphasize that the examination of alternatives is a requirement that is firmly established in the case law interpreting NEPA.

The BLM Draft EIS on the Allen-Warner Valley Energy Project evidently relied heavily on an analysis performed by the Environmental Defense Fund using a model developed by EDF economist Dr. W.R.Z. Willey. I have included a page from an EDF newsletter which references this report. Since EPA often uses consultants to help in writing EIS's, it would appear reasonable to consider contracting with EDF to perform a similar study for the TECO Big Bend 4 plant. EPA's role as a public agency should preclude passing the burden of analyzing reasonable alternatives to citizens who are serving as volunteer and unpaid representatives of the public interest. The public should have the responsibility to determine whether the EPA analysis of alternatives is adequate but should not be forced to do the bulk of the analysis.

In summary, the Sierra Club requests the following actions from EPA with respect to the EIS on Tampa Electric Company's Big Bend 4 application:

1) that conservation/use of renewable sources be included as one of the alternatives to be studied in the EIS process;

2) that the conservation/renewable sources alternative receive consideration and study equal to any other alternative as required by NEPA; and

3) that EPA use the Environmental Defense Fund-Willey model, previously endorsed by EPA in the BLM Allen-Warner Valley Energy System EIS process, to conduct a rigorous analysis of the conservation/renewable sources alternative.

Thank you again for your interest in this matter. If you have any questions about these requests, please feel free to contact me.

Yours truly,

Barney L Capehart

Barney L. Capehart
Power Plant Siting Chairman

cc (without enclosures):
Mr. H.L. Culbreath, TECO
Mr. Robert Howard, EPA
Mr. H.S. Oven, DER

SIERRA CLUB
FLORIDA CHAPTER

THE FLORIDA CHAPTER OF THE SIERRA CLUB IS GRAVELY CONCERNED ABOUT THE ECONOMIC AND ENVIRONMENTAL EFFECTS OF THE PRESENT RUSH TO BUILD MASSIVE NEW COAL-FIRED ELECTRICAL POWER PLANTS IN THE STATE OF FLORIDA.

SEVERAL RECENT STUDIES SUCH AS THE OFFICE OF TECHNOLOGY ASSESSMENT'S "DIRECT USE OF COAL", AND THE UNIVERSITY OF FLORIDA'S "COAL BURNING ISSUES" AND "IMPACTS OF INCREASED COAL USE IN FLORIDA" HAVE IDENTIFIED MANY MAJOR PROBLEMS INVOLVED WITH BURNING LARGE QUANTITIES OF COAL. WE ARE DEEPLY CONCERNED THAT THE PRESENT POLICY OF MASSIVE COAL USE IN FLORIDA HAS EMERGED WITHOUT A COMPLETE REVIEW BY RESPONSIBLE STATE AND FEDERAL AGENCIES AND THE PUBLIC IN GENERAL. SUCH A PROGRAM HAS TREMENDOUS PUBLIC POLICY IMPLICATIONS THAT APPEAR TO HAVE BEEN TOTALLY IGNORED.

SIGNIFICANT PROBLEMS OF COAL USE INVOLVE:
- AIR POLLUTION
- WATER POLLUTION
- COAL ASH DISPOSAL
- COAL SLUDGE DISPOSAL
- RADIOACTIVITY IN COAL WASTES
- VISIBILITY REDUCTION
- ACID RAIN
- COAL TRANSPORTATION HAZARDS

USE OF COAL IS NOT FLORIDA'S ONLY OPTION IN ANSWERING THE PROBLEMS OF HOLDING COSTS OF ELECTRICITY LOWER WHILE REDUCING OUR DEPENDENCE ON IMPORTED OIL. OTHER ALTERNATIVES ARE AVAILABLE WHICH ARE PROBABLY CHEAPER AND ARE UNDENIABLY LESS DEGRADING TO OUR ENVIRONMENT. THE STATE OF FLORIDA RELIES HEAVILY ON ITS IMAGE OF CLEAN AIR AND CLEAN WATER TO ATTRACT TOURISTS, NEW RESIDENTS AND NEW INDUSTRY. WE CANNOT AFFORD TO FOUL OUR OWN ENVIRONMENT WITH A POORLY JUSTIFIED POLICY TO BURN MASSIVE AMOUNTS OF COAL.

SOME OF THE ALTERNATIVES TO BUILDING NEW COAL-FIRED POWER PLANTS INCLUDE:
- USE OF COAL-OIL MIXTURES
- INCREASED SUPPLIES OF NATURAL GAS
- DIRECT USE OF OIL AND GAS
- CONSERVATION THROUGH INCREASED EFFICIENCY OF USE
- USE OF COGENERATION
- USE OF SOLAR/RENEWABLE ENERGY SOURCES

THE FLORIDA CHAPTER OF SIERRA CLUB HAS PREVIOUSLY EXPRESSED OUR GRAVE CONCERNS TO THE EPA REGARDING THE APPROVAL OF THE TECO BIG BEND 4 COAL FIRED POWER PLANT. DUE TO THE EXTREMELY SERIOUS ECONOMIC AND ENVIRONMENTAL PROBLEMS POSSIBLE FROM BUILDING NEW COAL FIRED POWER PLANTS, WE REQUESTED THAT THE EPA:

1. INCLUDE CONSERVATION/USE OF RENEWABLE SOURCES AS ONE OF THE ALTERNATIVES TO BE STUDIED IN THE EIS PROCESS;

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2. THAT THE CONSERVATION/RENEWABLE SOURCES ALTERNATIVE RECEIVE CONSIDERATION AND STUDY EQUAL TO ANY OTHER ALTERNATIVE AS REQUIRED BY NEPA; AND

3. THAT EPA USE THE ENVIRONMENTAL DEFENSE FUND-WILLEY MODEL, PREVIOUSLY ENDORSED BY EPA IN THE BLM ALLEN-WARNER VALLEY ENERGY SYSTEM EIS PROCESS TO CONDUCT A RIGOROUS ANALYSIS OF THE CONSERVATION/RENEWABLE SOURCES ALTERNATIVE.

THE DRAFT EIS DISCUSSION OF CONSERVATION AND RENEWABLE ENERGY SOURCES AS AN ALTERNATIVE IS LIMITED TO THE FLORIDA PSC REVIEW WITH RESPECT TO THE RECENTLY ENACTED STATE ELECTRICAL ENERGY CONSERVATION GOALS. THUS, THE EPA HAS TOTALLY ABROGATED ITS RESPONSIBILITY FOR CONDUCTING A THOROUGH INVESTIGATION OF CONSERVATION AND RENEWABLE ENERGY SOURCES AS A VIABLE ALTERNATIVE. THE FLORIDA PSC REVIEW OF THE NEED QUESTION NEVER ADDRESSED THE POSSIBILITY THAT A CONSERVATION/RENEWABLES PROGRAM OF INCREASED SCOPE COULD TOTALLY ELIMINATE THE NEED FOR THE TECO BIG BEND 4 PLANT. THE CONSERVATION GOALS SET BY THE FLORIDA PSC ARE ADMIRABLE IN THAT A STATE POLICY OF CONSERVATION IS PROMOTED, BUT THE MAGNITUDE OF THE GOALS IS CLEARLY FAR BELOW THE READILY ACHIEVABLE REDUCTIONS POSSIBLE USING PRESENT TECHNOLOGY. CONSERVATION PLANS SUBMITTED BY THE FLORIDA UTILITIES, INCLUDING TECO, SHOWED A WIDE ARRAY OF COST-EFFECTIVE PROGRAMS FOR REDUCING ELECTRIC ENERGY CONSUMPTION BY IMPROVING END USE EFFICIENCY AND BY INITIATING RENEWABLE ENERGY SOURCE PROGRAMS.

THERE IS SIGNIFICANT EXPECTATION THAT A CONSERVATION/RENEWABLE SOURCE PROGRAM COULD BE A VIABLE ALTERNATIVE TO THE 425 MW BIG BEND 4 PLANT. THE EDF STUDY OF THE ALLEN-WARNER VALLEY PROJECT IN CALIFORNIA SHOWED THAT ALTERNATIVE SOURCES COULD PROVIDE MORE ENERGY IN THE SAME TIME PERIOD, AT LOWER COSTS AND WITH FAR LESS ENVIRONMENTAL RISK. THE EPA ENDORSED THE CONCLUSIONS OF THAT EDF STUDY AND SUBSEQUENTLY REFUSED TO GRANT A CLEAN AIR PERMIT FOR THE PROPOSED COAL FIRED PROJECT. SUCH A STUDY RELATIVE TO THE BIG BEND 4 PLANT WOULD VERY LIKELY SHOW SIMILAR RESULTS. THE SIZE OF THE PLANT IS SMALL WITH RESPECT TO THE LOAD OF THE TOTAL TECO SYSTEM, AND CAN THEREFORE BE REPLACED BY REASONABLE CONSERVATION/RENEWABLE SOURCE ALTERNATIVE PROGRAMS. THE FAILURE OF EPA TO PURSUE SUCH A STUDY IN THE TECO CASE APPEARS INDICATIVE OF EPA'S NEW ROLE IN FAVORING INDUSTRIAL EXPANSION REQUESTS REGARDLESS OF THE PHYSICAL AND ECONOMIC COSTS TO THE CONSUMER.

SEVERAL SPECIFIC CONSERVATION PROGRAMS WITH LARGE POTENTIAL FOR THE TECO SERVICE AREA ARE:

A. REPLACEMENT OF PRESENT REFRIGERATORS WITH HIGH EFFICIENCY MODELS WHICH WOULD RESULT IN AN AVERAGE SAVING OF ALMOST 1000KWH PER YEAR FOR EACH RESIDENTIAL CUSTOMER.

B. REPLACEMENT OF PRESENT ELECTRIC RESISTANCE WATER HEATERS WITH SOLAR UNITS WHICH WOULD RESULT IN AN AVERAGE SAVING OF 2500KWH PER YEAR FOR EACH RESIDENTIAL CUSTOMER.

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C. REPLACEMENT OF PRESENT CENTRAL AIR CONDITIONERS WITH HIGH EFFICIENCY UNITS WHICH WOULD RESULT IN AN AVERAGE SAVING OF ABOUT 1500KWH PER YEAR FOR EACH RESIDENTIAL CUSTOMER.

D. SIMILAR PROGRAMS FOR COMMERCIAL CUSTOMERS PLUS COGENERATION COULD RESULT IN EVEN GREATER PERCENTAGE SAVINGS IN THIS SECTOR.

ALTHOUGH UTILITIES FREQUENTLY ALLEGE THAT THEY HAVE NO CONTROL OVER CUSTOMER'S EFFICIENCY DECISIONS. THE TRUTH IS THAT INNOVATIVE PROGRAMS CAN INDEED INFLUENCE APPLIANCE MARKETING STRATEGIES AS WITNESSED WHEN UTILITIES PROMOTED ELECTRIC APPLIANCES AND ALL-ELECTRIC HOMES. FURTHERMORE, THE POLICY OF HAVING PRIVATE INDUSTRY PROMOTE SOCIAL POLICIES RATHER THAN THE GOVERNMENT APPEARS TO BE THE CORNERSTONE OF PRESIDENT REAGAN'S PHILOSOPHY. THUS. IF AN EPA STUDY PROVED CONSERVATION TO BE THE MOST COST-EFFECTIVE ALTERNATIVE, TECO WOULD HAVE THE OPPORTUNITY TO EMBRACE THE REAGAN APPROACH WHOLEHEARTEDLY.

BUILDING A NEW COAL FIRED POWER PLANT AT $1000 PER KW CAPACITY PROVIDES ELECTRICITY AT A COST OF ABOUT 9 CENTS PER KWH. AT THIS PRICE, MANY PROGRAMS OF CONSERVATION, RENEWABLE SOURCES AND COGENERATION BECOME COST-EFFECTIVE. IN ADDITION, THE SAME OIL REDUCTION POSSIBLE FROM BURNING COAL IS OBTAINED BY THESE CHEAPER AND CLEANER ALTERNATIVES WHICH DO NOT HAVE THE SEVERE ENVIRONMENTAL PROBLEMS WITH THEIR USE AS COAL DOES.

THE VERY PURPOSE OF HAVING A REQUIREMENT FOR EVALUATION OF ALTERNATIVES FOR NEW COAL FIRED POWER PLANTS IN THE EIS IS TO AID IN IDENTIFYING AND ADOPTING THESE CLEANER AND CHEAPER APPROACHES. THE EPA HAS NOT ONLY FAILED IN ITS LEGAL OBLIGATION TO PROVIDE A THOROUGH ANALYSIS OF ALTERNATIVES, BUT IT HAS ALSO FAILED THE VAST MAJORITY OF FLORIDA CITIZENS WHO WANT CLEAN AIR, CLEAN WATER AND THE LEAST EXPENSIVE APPROACH TO SATISFYING THEIR ENERGY SERVICE NEEDS.

THE DRAFT EIS CONCLUSION THAT "HOWEVER....ACCORDINGLY, CONSERVATION WAS NOT CONSIDERED TO BE AN APPROPRIATE MANAGEMENT ALTERNATIVE." IS COMPLETELY IRRELEVANT SINCE NO THOROUGH STUDY OF CONSERVATION WAS EVER CONDUCTED BY THE FLORIDA PSC OR THE EPA. THUS. THE DRAFT EIS IS CLEARLY INADEQUATE. AND A THOROUGH STUDY OF CONSERVATION AND RENEWABLE ENERGY SOURCES MUST BE PERFORMED AND INCLUDED IN THE FINAL EIS IN ORDER FOR IT TO MEET EPA'S LEGAL OBLIGATION.

IN SUMMARY. THE EPA HAS A LEGAL RESPONSIBILITY TO IDENTIFY AND STUDY ALL VIABLE ALTERNATIVES. CALVERT CLIFFS COORDINATING COMM. V. U.S. ATOMIC ENERGY COMMISSION 449 F.2D 1109 (D.C. CIR. 1971). FURTHERMORE, EPA HAS ALREADY ESTABLISHED A PRECEDENT FOR STUDYING THE CONSERVATION ALTERNATIVE. SEE THE ALLEN-WARNER VALLEY ENERGY SYSTEM EIS. IN ADDITION. EPA IS CONDUCTING SUCH A STUDY FOR ANOTHER FLORIDA UTILITY. THE JACKSONVILLE ELECTRIC AUTHORITY. JEA IS 100% DEPENDENT ON OIL UNLIKE TECO WHICH ALREADY HAS SUBSTANTIAL COAL GENERATING CAPACITY. TO PERFORM THE STUDY FOR JEA WHILE IGNORING THE ALTERNATIVES FOR TECO APPEARS IRRESPONSIBLE.

THE SIERRA CLUB REITERATES ITS FORMAL REQUEST THAT EPA ADHERE TO THE REQUIREMENTS OF THE LAW IN FORMULATING THE FINAL EIS FOR THE TECO BIG BEND 4 PLANT. FOLLOWING MINIMUM LEGAL REQUIREMENTS SHOULD BE STANDARD AGENCY PROCEDURE AND SHOULD NOT REQUIRE LEGAL BATTLES FROM CITIZEN GROUPS TO ASSURE SUCH COMPLIANCE.

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ATTACHMENT I

Conservation Alternative to Big Bend 4

A. Energy Output of Big Bend 4

417 MW capacity at 60% use
417,000 KW x 5256 KWH/KW = 2192 GWH

B. Residential Conservation Measures
(based on 300,000 customers)

1. Replace refrigerators by high efficiency models
   Savings of 924 KWH/customer
   100% saturation of refrigerators
   924x300,000 = 277 GWH

2. Replace resistance water heaters with gas models
   Savings of 3600 KWH
   93% saturation of electric w/h
   .93x3600x300,000 = 1004 GWH

3. Replace strip heaters by gas heaters
   Savings of 4800 KWH
   47% saturation of strip heaters
   .47x4800x300,000 = 677 GWH

4. Replace central air conditioners with high efficiency units
   Savings of 2000 KWH
   52.5% saturation of central a/c
   .52x2000x300,000 = 315 GWH

5. Replace window air conditioners with high efficiency units
   Savings of 666 KWH
   32% saturation of window a/c
   .32 x 666 x 300,000 = 64 GWH

Total savings 2337 GWH

C. Thus, the conservation potential is there from only the residential sector, and this sector accounts for only 35% of the total energy produced by TECO.

RESPONSES TO WRITTEN COMMENTS

RESPONSE FDA-1

Comment acknowledged.

RESPONSE SCS-1

Comment acknowledged.

RESPONSE DER-1

Errata. Corrected page is included in Chapter 2 of this FEIS.

RESPONSE DER-2

Comment acknowledged.

RESPONSE COE-1

The executive summary has been rewritten to clarify this point. See the executive summary of this FEIS.

RESPONSE CDC-1

The Hillsborough County Mosquito Control Board (HCMCB) has been contacted regarding potential vector habitat areas in the Tampa area in general and the Big Bend site in particular. The HCMCB is familiar with the Big Bend site, and TECO has worked and cooperated with the HCMCB to address potential vector habitat areas. In the past, measures have been employed to minimize habitat potential in the spray irrigation field, a major area of concern. These measures have included providing better drainage and maintaining a low cut grass height. The HCMCB has indicated the potential for vector-borne impacts is minimal in the Big Bend area. It is anticipated these potential problems will continue to be controlled.

RESPONSE CDC-2

The variance is for the mixing zone and is needed primarily because the ambient water quality in Tampa Bay exceeds the Florida Water Quality Standards (as noted in the comment). Because operation of the facility requires use of Tampa Bay water, discharge of this very same water would exceed the Standards. Analysis indicates there would be no analytically detectable increase in the levels of these metals in the discharge canal. Under provisions of the Florida Statutes, a variance for Unit 4 from the Florida Department of Environmental Regulation's water quality standards has been granted for two years.

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RESPONSE CDC-3

The isothermal contour maps shown in Figures 3-37 and 3-38 of the DEIS serve to illustrate in an idealized manner the aerial extent of the expected surface plume relative to average temperature increases above ambient conditions. The maps are not a realistic depiction of the plume's configuration because the instantaneous effects of wind and tide are not considered in the computer simulation. Infrared imagery of the actual surface plume configuration are provided in 1977 Big Bend Station Section 316 Demonstration (TECO, 1977). The aerial photographs demonstrate the variable nature of the surface plume configuration relative to tide phase. In some instances, tidal forces direct portions of the surface plume laterally from the point of discharge and along the shoreline of Apollo Beach. Consequently, some mixing of the heated effluent with embayment water occurs. Similar mixing events were also documented with aerial imagery in November 1979 by EPA surveillance of the plume. It can be concluded that the mixing of heated effluent with embayment water will be a continuing feature of the surface plume. Based on data presented in the DEIS and supporting resource documents, adverse effects of the thermal mixing on aquatic life in the embayment cannot be demonstrated. See also response to HEC-5.

RESPONSE CDC-4

The cooling pond shown in Figure 3-7 was never used for cooling the discharge from the station. It was constructed as part of an earlier cooling system which was subsequently abandoned.

RESPONSE CDC-5

A detailed discussion, based on all available data relating to the terrestrial and aquatic ecology of the Apollo Beach northern embayment, is presented in the Technical Reference Document (TRD) accompanying the Big Bend 4 DEIS.

Characterizations of the flora and fauna of the mangrove and transitional salt prairie communities are presented in TRD Sections 2.2.4 and 5.2.4. The areal extent of mangrove and other wetland communities within the Tampa Bay System is delineated in Figure 2-8 and Table 2-51; Table 2-52 lists the extent of wetland losses due to development activities (as of 1972) within the Tampa Bay System.

Comparison of the general areal extent of the mangrove community in the embayment with that remaining in other parts of Tampa Bay is possible; however, there are no quantitative data (community composition, plant densities, associated fauna) to compare the relative quality or value of these communities.

Section 5.3 of the TRD contains information which includes a characterization of the embayment as to water quality (Table 5-40), benthic macrophytes (Section 5.3.4.2), benthic invertebrates (Section 5.3.4.4), and fishes (Section 5.3.4.5). The characterization of the fish community includes an evaluation of the value of the embayment as a nursery area. The discussions cited above consider all available information on the ecology of the embayment. No quantitative data exist to fully evaluate the migration of aquatic organisms to and from the embayment or the effects of existing and future power plant discharges on this process. However, studies conducted at the Big Bend site have revealed the transitory nature of fish species assemblages in the embayment. Seasonal shifts in community structure that were observed were related to the influx of the young of various species during the study period. These data were collected during three unit operation of the Big Bend Power Plant. Therefore, it is not expected that plant discharge currents seriously affect movement of fishes in and out of the embayment.

RESPONSE CDC-6

While the use of the area by manatees may increase with the increase in thermal discharges, Big Bend Unit 4 is not thought to affect the overall manatee population. The thermal discharge serves as a winter visiting site for manatees migrating in the Tampa Bay System. Consequently, in that manatee migration in the Apollo Beach area is anticipated to remain relatively constant, no changes specifically attributable to Big Bend Unit 4 have been identified.

Increasing development (industrial & residential) and boating activity in the Tampa Bay area will continue to influence the manatee population in this area.

RESPONSE WMD-1

Comment acknowledged.

RESPONSE WMD-2

The executive summary has been rewritten to clarify this matter. See the executive summary of this FEIS.

RESPONSE TECO-1

Comment acknowledged.

RESPONSE TECO-2

EPA was in concurrence with discontinuance of the chlorine die-away study as indicated by TECO. The study was attempted by TECO and halted for the reasons described. The final draft NPDES permit will contain a requirement to conduct the study.

RESPONSE TECO-3

EPA has included the 0.2 mg/ℓ TRO limit in the final draft NPDES permit. A chlorine minimization study is under way by TECO to determine minimum levels of chlorine necessary for biofouling control. Subsequent to completion of the study, the permit requires minimization consistent with study results. Should conditions require further reductions in TRO discharge subsequent to completion of the study and the die-away study (see response to TECO 2), permit modification can be pursued at that time.

EPA notes that the Florida Governor and Cabinet have approved a variance from the Florida water quality standards for discharges from Unit 4. EPA concurs with the technical propriety of the variance from metal criteria.

RESPONSE TECO-4

The comment appears to be consistent with the approved State variance and the language has been changed in the final EIS. The permit rationale will likewise be corrected.

RESPONSE TECO-5

Comment acknowledged.

RESPONSE TECO-6

The language has been clarified.

RESPONSE TECO-7

Comment noted.

RESPONSE TECO-8

The comment is correct and an appropriate correction will be made in final draft NPDES Permit.

RESPONSE TECO-9

A groundwater monitoring program was received by EPA on July 31, 1981. EPA has reviewed the proposed program and has requested that additional wells at varying depths be installed to the west of the disposal areas. Additionally, EPA has requested that TECO submit information on the construction features of the wells. A copy of the revised monitoring plan is included in Chapter 3 of this FEIS.

RESPONSE TECO-10

The comment appears to be consistent with the approved State variance. The permit rationale will be corrected.

RESPONSE TECO-11

The requested condition will be included in the final draft NPDES Permit, as will a reopener provision relative to submission of a treatability study for suspended metals in the slag pond effluent.

RESPONSE TECO-12

Applicable provisions will be included in the final draft permit and rationale after action by the State of Florida and concurrence by EPA has occurred.

RESPONSE TECO-13

The reference to the flue-gas O_2 or CO_2 monitor was included through error. It has been omitted in the Final Determination.

RESPONSE TECO-14

Condition 11 requires that "the applicant shall maintain records of all coal washing and preparation activities . . ." However, in order to prevent any misinterpretation, the reference to a minimum potential sulfur dioxide emission removal will be struck. Condition 11 will remain in the Final Determination but will be reworded for clarity and precision.

RESPONSE TECO-15

The correct number, of 15,552 tons per year, will be inserted in the Final Determination.

RESPONSE TECO-16

Comment noted.

RESPONSE TECO-17

A copy of the current version of Chapter 17-3 is included on the following pages.

RESPONSE HEC-1

See response to written comment SC-7.

RULES

OF THE

DEPARTMENT OF ENVIRONMENTAL REGULATION

CHAPTER 17-3

WATER QUALITY STANDARDS

PART I Findings, Declaration and Intent
17-3.01 Declaration and Intent
17-3.011 Findings, Declaration and Intent
17-3.02 Minimum Conditions of All Waters, Times and Places
PART II Definitions
17-3.021 Definitions
PART III Water Quality Criteria
17-3.03 Water Quality Testing
17-3.031 Site Specific Alternative Criteria
17-3.04 Domestic and Industrial Waste Treatment Requirements
17-3.041 Special Protection, Outstanding Florida Waters
17-3.05 Thermal Surface Water Criteria
17-3.051 Minimum Criteria for All Waters at All Times and All Places
17-3.06 Classification of Waters, Usage
17-3.061 Surface Waters: General Criteria
17-3.07 Criteria: Class I Waters — Public Water Supply
17-3.071 Groundwaters: General Criteria
17-3.08 Criteria: Class II Waters — Shellfish Propagation and Harvesting
17-3.081 Classification of Waters, Usage, Reclassification
17-3.09 Criteria: Class III Waters — Recreation — Propagation and Management of Fish and Wildlife
17-3.091 Criteria: Class I-A Waters — Potable Water Supplies — Surface Waters
17-3.10 Criteria: Class IV Waters — Agricultural and Industrial Water Supply
17-3.101 Criteria: Class I-B Waters — Potable and Agricultural Water Supplies and Storage — Groundwaters (New)
17-3.11 Criteria: Class V Waters — Navigation, Utility and Industrial Use
17-3.111 Criteria: Class II Waters — Shellfish Propagation or Harvesting — Surface Waters
17-3.12 Definitions
17-3.121 Criteria: Class III Waters — Recreation — Propagation and Management of Fish and Wildlife — Surface Waters
17-3.13 Drainage Wells, Permits
17-3.131 Criteria: Class IV Water — Agricultural Water Supplies — Surface Waters
17-3.14 Drainage Wells, Applications
17-3.141 Criteria: Class V-A Waters — Navigation, Utility, and Industrial Use — Surface Waters
17-3.15 Effective Date of Permits
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17-3.16 Drainage Wells, Drilling Requirements
17-3.161 Classified Waters
17-3.17 Drainage Well Permit Revocation and Modification
17-3.18 Test Wells and Borings
17-3.19 Abandoned Wells
17-3.20 Pollution Surveys
17-3.21 Classified Waters
17-3.22 Application Forms

PART I FINDINGS, DECLARATION AND INTENT

17-3.01 Declaration and Intent.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.101(1), 403.182, 403.261 FS. History—Formerly 28-5.01, Amended and Renumbered as 17-3.011, 3-1-79.

17-3.011 Findings, Declaration and Intent.

(1) Article II, Section 7 of the Florida Constitution requires abatement of water pollution, and conservation and protection of Florida's natural resources and scenic beauty.

(2) Section 403.021, Florida Statutes, declares that the public policy of the State is to conserve the waters of the State to protect, maintain, and improve the quality thereof for public water supplies, for the propagation of wildlife, fish and other aquatic life, and for domestic, agricultural, industrial, recreational, and other beneficial uses. It also prohibits the discharge of wastes into Florida waters without treatment necessary to protect those beneficial uses of the waters.

(3) Congress, in Section 101(a)(2) of the Federal Water Pollution Control Act, as amended, declares that achievement by July 1, 1983, of water quality sufficient for the protection and propagation of fish, shellfish, and wildlife, as well as for recreation in and on the water, is an interim goal to be sought wherever attainable. Congress further states, in Section 101(a)(3), that it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited.

(4) The present and future most beneficial uses of all waters of the State have been designated by the Department by means of the classification system set forth in this Chapter pursuant to Subsection 403.061(10), F.S. Water quality standards are established by the Department to protect these designated uses.

(5) Pollution which causes or contributes to new violations of water quality standards or to continuation of existing violations is harmful to the waters of this State and shall not be allowed.

(6) The quality of waters which exceeds the minimum quality necessary to support the designated use of those waters shall be protected and enhanced.

(7) The quality of waters which is lower than that necessary to support the designated use of those waters shall be protected and enhanced provided, however, the Department shall not strive to abate natural conditions.

(8) The highest protection shall be afforded to Outstanding Florida Waters.

(9) Because activities outside the State sometimes cause pollution of Florida's waters, the Department will

make every reasonable effort to have such pollution abated.

(10) Water quality standards apply equally to and shall be uniformly enforced in both the public and private sector.

(11) The Department finds that excessive nutrients (total nitrogen and total phosphorus) constitute one of the most severe water quality problems facing the State. It shall be the Department's policy to limit the introduction of man-induced nutrients into waters of the State. Particular consideration shall be given to the protection from further nutrient enrichment of waters which are presently high in nutrient concentrations and sensitive to further nutrient concentrations and sensitive to further nutrient loadings. Also, particular consideration shall be given to the protection from nutrient enrichment of those waters presently containing very low nutrient concentrations: less than 0.3 milligrams per liter total nitrogen or less than 0.04 milligrams per liter total phosphorus.

(12) Public interest shall not be construed to mean only those activities conducted solely to provide facilities or benefits to the general public. Private activities conducted for private purposes may also be in the public interest.

(13) The Commission, recognizing the complexity of water quality management and the necessity to temper regulatory actions with the technological progress and the social and economic well-being of people, urges, however, that there be no compromise where pollutional discharges constitute a valid hazard to human health.

(14) The Commission requests that the Secretary seek and use the best environmental information available when making decisions on the effects of chronically and acutely toxic substances and carcinogenic, mutagenic, and teratogenic substances. Additionally, the Secretary is requested to seek and encourage innovative research and developments in waste treatment alternatives that might better preserve environmental quality and/or at the same time reduce the energy and dollar costs of operation.

(15) The present and future most beneficial uses of groundwaters of the State shall be protected to insure the availability and utility of this invaluable resource. To achieve such protection, the groundwaters of the State are classified for the first time and appropriate specific water quality criteria for those classes are set forth in this Chapter.

(16) The criteria set forth in this Chapter are minimum levels which are necessary to protect the designated uses of a water body. It is the intent of this Commission that permit applicants should not be penalized due to a low detection limit associated with any specific criteria.

(17) In adoption of the Outstanding Florida Waters designated on July 13, 1978, the Commission has been assured by the Secretary that adequate public notice has been given that these waters were being considered for this designation and that public comment was solicited and considered in determining their designation.

(18)(a) The revisions made to Chapters 17-3 and 17-4 and the adoption of Chapter 17-6, Florida Administrative Code, are designed to protect the public health or welfare and to enhance the quality of waters of the State. They have been established taking into consideration the use and value of waters of the State for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes, and also taking into consideration their use and value for navigation.

(b) Under the approach taken in the formulation of the rules adopted in this proceeding:

1. These revisions to Chapters 17-3, 17-4 and adoption of Chapter 17-6, F.A.C., are based upon the best scientific knowledge related to the protection of the various designated uses of waters of the State; and

2. The mixing zone, zone of discharge, exception, exemption, and equitable allocation provisions are designed to provide an opportunity for the future consideration of factors relating to localized situations which could not adequately be addressed in this proceeding, including economic and social consequences, attainability, irretrievable conditions, natural background, and detectability.

(c) This is an even-handed and balanced approach to attainment of water quality objectives. The Commission has specifically recognized that the social, economic and environmental costs may, under certain special circumstances, outweigh the social, economic and environmental benefits if the numerical criteria are enforced statewide. It is for that reason that the Commission has provided for mixing zones, zones of discharge, exceptions, exemptions and other provisions in Chapters 17-3, 17-4, and 17-6, F.A.C. Furthermore, the continued availability of the moderating provisions is a vital factor providing a basis for the Commission's determination that water quality standards applicable to water classes in the rule are attainable taking into consideration environmental, technological, social, economic and institutional factors. The companion provisions of Chapters 17-4 and 17-6, F.A.C., approved simultaneously with these Water Quality Standards are incorporated herein by reference as a substantive part of the State's comprehensive program for the control, abatement and prevention of water pollution.

(d) Without the moderating provisions described in (b)2. above, the Commission would not have adopted the revisions described in (b)1. above nor determined that they are attainable as generally applicable water quality standards.

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804, 403.805 FS. Law Implemented 403.021, 403.061, 403.085, 403.086, 403.087, 403.088, 403.101, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708, 403.802 FS. History—Formerly 28-5.01, 17-3.01, Amended and Renumbered 3-1-79.

17-3.02 Minimum Conditions of All Waters, Times and Places.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101(1) FS. History—Formerly 28-5.02, Amended 10-28-70, Amended and Renumbered as 17-3.051, 3-1-79.

PART II DEFINITIONS

17-3.021 Definitions.

(1) "Acute Toxicity" shall mean the presence of one or more substances or characteristics or components of substances in amounts which:

(a) Are greater than one-third (1/3) of the amount lethal to 50% of the test organisms in 96 hours (96 hr LC_{50}) where the 96 hr LC_{50} is the lowest value which has been determined for a species significant to the indigenous aquatic community; or

(b) may reasonably be expected, based upon evaluation by generally accepted scientific methods, to produce effects equal to those of the concentration of the substance specified in (a) above.

(2) "Background" shall mean the condition of waters in the absence of the activity or discharge under consideration, based on the best scientific information available to the Department.

(3) "Chronic Toxicity" shall mean the presence of one or more substances or characteristics or components of substances in amounts which:

(a) are greater than one-twentieth (1/20) of the amount lethal to 50% of the test organisms in 96 hours (96 hr LC_{50}) where the 96 hr LC_{50} is the lowest value which has been determined for a species significant to the indigenous aquatic community; or

(b) may reasonably be expected, based upon evaluation by generally accepted scientific methods, to produce effects equal to those of the concentration of the substance specified in (a) above.

(4) "Commission" shall mean the Environmental Regulation Commission.

(5) "Compensation Point for Photosynthetic Activity" shall mean the depth at which one percent of the light intensity at the surface remains unabsorbed. This depth shall be computed as two divided by the extinction coefficient.

(6) "Department" shall mean the Department of Environmental Regulation.

(7) "Designated Use" shall mean the present and future most beneficial use of a body of water as designated by the Environmental Regulation Commission by means of the classification system contained in this Chapter.

(8) "Dominance" shall mean the presence of species or communities in greater numbers, biomass, or areal extent than competing species or communities, or a scientifically accepted tendency of species or communities to achieve such a status under existing or reasonably anticipated conditions.

(9) "Effluent Limitation" shall mean any restriction established by the Department on quantities, rates or concentrations of chemical, physical, biological or other constituents which are discharged from sources into waters of the State.

(10) "Exceptional Ecological Significance" shall mean that a water body is a part of an ecosystem of unusual value. The exceptional significance may be in unusual species, productivity, diversity, ecological relationships, ambient water quality, scientific or educational interest, or in other aspects of the ecosystem's setting or processes.

(11) "Exceptional Recreational Significance" shall mean unusual value as a resource for outdoor recreation activities. Outdoor recreation activities include, but are not limited to, fishing, boating, canoeing, water skiing, swimming, scuba diving, and nature observation. The exceptional significance may be in the intensity of present recreational usage, an unusual quality of recreational experience, or possessing a potential for unusual future recreational use or experience.

(12) "Extinction Coefficient" shall mean: $(1/D \log_{10}(S_s/S_D))$ where D is the length of the light path, S_s is the light intensity at the surface or the transmission value of light through a distilled or deionized water sample of thickness D, and S_D is the light intensity at depth D or the transmission value of light through a sample of the water tested of thickness D. Light intensities or transmission values shall be measured using a cadmium sulfide photoreceptor or other device having a comparable spectral response.

(13) "Groundwater" shall mean water beneath the surface of the ground, whether or not flowing through known and definite channels.

(14) "Natural Background" shall mean the condition of waters in the absence of man-induced alterations based on the best scientific information available to the Department.

(15) "Nuisance Species" shall mean species of flora or fauna whose presence in sufficient number, biomass, or areal extent may reasonably be expected to prevent, or unreasonably interfere with, a designated use of those waters.

(16) "Nursery Area of Indigenous Aquatic Life" shall mean any bed of the following aquatic plants, either in monoculture or mixed: *Halodule* spp., *Halophila engelmannii*, *Potamogeton* spp. (pondweed), *Ruppia maritima* (widgeon-grass), *Sagittaria* spp. (arrowhead), *Syringodium filiforme* (manatee-grass), *Thallasia testudinum* (turtle grass), or *Vallisneria* spp. (eel-grass), or any area used by the early-life stages, larvae and post-larvae, of aquatic life during the period of rapid growth and development into the juvenile states.

(17) "Pollution" shall mean the presence in the outdoor atmosphere or waters of the state of any substances, contaminants, noise, or man-made or man-induced alteration of the chemical, physical, biological or radiological integrity of air or water in quantities or levels which are or may be potentially harmful or injurious to human health or welfare, animal or plant life, or property, including outdoor recreation.

(18) "Predominantly Fresh Waters" shall mean those surface waters in which the specific conductance of the water at the surface is less than 5,000 micromhos per centimeter.

(19) "Predominantly Marine Waters" shall mean those surface waters in which the specific conductance of the water at the surface is greater than or equal to 5,000 micromhos per centimeter.

(20) "Propagation" shall mean reproduction sufficient to maintain the species' role in its respective ecological community.

(21) "Secondary and Tertiary Canals" shall mean any wholly artificial canal or ditch which is behind a control structure and which is part of a water control system that is connected to the works (set forth in Section 373.086, F.S.) of a water management district created under Section 373.069, F.S., and that is permitted by such water management district pursuant to Section 373.103, Section 373.413, or Section 373.416, F.S.

(22) "Secretary" shall mean the Secretary of the Department of Environmental Regulation.

(23) "Shannon-Weaver Diversity Index" shall mean: negative summation (from i-1 to S) of $(n_i/N) \log_2 (n_i/N)$ where S is the number of species in a sample, N is the total number of individuals in species i.

(24) "Special Waters" shall mean water bodies designated in accordance with Section 17-3.041, F.A.C., by the Environmental Regulation Commission for inclusion in the Special Waters Category of Outstanding Florida Waters, as contained in Section 17-3.041, F.A.C. A Special Water may include all or part of any water body.

(25) "Surface Water" means water upon the surface of the earth, whether contained in bounds created naturally or artificially or diffused. Water from natural springs shall be classified as surface water when it exits from the spring onto the earth's surface.

(26) "Waters" shall be as defined in Section 403.031(3), Florida Statutes.

(27) "Zone of Discharge" shall mean a volume underlying or surrounding the point of discharge within which an opportunity for the treatment, mixture or dispersion of wastes into receiving groundwaters has been afforded.

(28) "Zone of Mixing" or "Mixing Zone" shall mean a volume of surface water containing the point or area of discharge and within which an opportunity for the mixture of wastes with receiving surface waters has been afforded.

Specific Authority 403.061, 403.062, 403.067, 403.504, 403.704, 403.804, 403.805 FS. Law Implemented 403.021, 403.031, 403.061, 403.085, 403.086, 403.087, 403.088, 403.502, 403.802 FS. History—Formerly 28-5.12, 17-3.12, Amended and Renumbered 3-1-79.

PART III WATER QUALITY CRITERIA

17-3.03 Water Quality Testing.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.03, Amended and Renumbered as 17-3.161, 3-1-79.

17-3.031 Site Specific Alternative Criteria.

(1) Upon petition of an affected person, permit or upon the initiation of the Department, applicant, after public notice and opportunity for public hearing, and upon affirmative demonstration that, due to man-induced causes which cannot be controlled or abated with technology or management practices including zero discharge, or due to natural causes, certain delineated portions of waters of the State do not meet particular water quality criteria contained in this Chapter, the Secretary may issue an order specifying an alternative ambient water quality criterion for each parameter and the portion of the waters for which such demonstration has been made.

(2) The petitioner or the Department shall affirmatively demonstrate those criteria which the petitioner or the Department believes more appropriately apply to the waters for which the alternative criteria are sought, based upon relevant factors which include, but are not limited to, the designated use of the waters, the extent to which biota have adapted to the background, evidence regarding ecological stress, and adverse impacts on adjoining waters.

(3) The Secretary shall specify, by order, the site specific criteria for the parameters which the Secretary determines to have been demonstrated by the preponderance of competent substantial evidence to be more appropriate.

(4) The Department shall modify permits of existing sources affected in a manner consistent with the Secretary's Order.

(5) Additional relief from criteria established by this Chapter may be provided through exemption pursuant to Section 17-4.243, Florida Administrative Code, or variances as provided for by Section 17-1.57, Florida Administrative Code.

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804, 403.805 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.201, 403.502 FS. History—Formerly 17-3.05(4), Amended 3-1-79, 10-2-80.

17-3.04 Domestic and Industrial Waste Treatment Requirements.

Specific Authority 403.061(7) FS. Law Implemented 403.086, 403.087, 403.088 FS. History—Formerly 28-5.04, Amended 10-28-70, 10-17-72, 7-20-76, Transferred to 17-6.01, 3-1-79.

17-3.041 Special Protection, Outstanding Florida Waters.

(1) It shall be the Department policy to afford the highest protection to Outstanding Florida Waters (a complete listing of which is provided in subsection (3)) which generally include the following surface waters:

(a) waters in National Parks, Wildlife Refuges and Wilderness Areas; and

(b) waters in the State Park System and Wilderness Areas; and

(c) waters in Environmentally Endangered Lands which have been acquired under Chapter 259, Florida Statutes; and

(d) rivers designated under the Florida Scenic and Wild Rivers Program or the National Wild and Scenic Rivers Act; and

(e) waters within National Seashores, National Marine Sanctuaries, National Estuarine Sanctuaries and certain National Monuments; and

(f) waters in Aquatic Preserves created under the provisions of Chapter 258, Florida Statutes; and

(g) waters within the Big Cypress National Freshwater preserve; and

(h) Special waters as listed in 17-3.041(4)(g).

(2) Each water body demonstrated to be of exceptional recreational or ecological significance may be designated as a Special Water. The following procedure shall be used in designating a Special Water after the adoption of this rule:

(a) Rulemaking procedures pursuant to Chapter 120, F.S., and Chapter 17-1 F.A.C., shall be followed;

(b) At least one fact-finding workshop shall be held in the affected area;

(c) All local county or municipal governments and state legislators whose districts or jurisdictions include all or part of a Special Water shall be notified at least 60 days prior to the workshop in writing by the Secretary;

(d) A prominent public notice shall be placed in a newspaper of general circulation in the area of the proposed Special Water at least 60 days prior to the workshop;

(e) An economic impact analysis, consistent with Chapter 120, shall be prepared which provides a general analysis of the impact on growth and development including such factors as impacts on planned or potential industrial, agricultural, or other development or expansion; and

(f) The Commission may designate a water of the State as a Special Water after making a finding that the waters are of exceptional recreational or ecological significance and a finding that the environmental, social, and economic benefits of the action outweigh the environmental, social, and economic costs.

(3) The policy of this section shall be implemented through the permitting process pursuant to Section 17-4.242, F.A.C.

(4) Outstanding Florida Waters:

(a) Waters within National Parks

National Park	County
Everglades	Monroe/Dade/Collier

(b) Waters within Wildlife Refuges

Wildlife Refuge	County
Loxahatchee	Palm Beach
Pig Island	Gulf
St. Vincent	Franklin
Chassahowitzka	Citrus/Hernando
Anclote	Pasco
Pinellas	Pinellas
Okeefenokee (Florida Portion)	Baker
Anclote Island	Indian River
Pelican Island	Indian River
Hobe Sound	Martin
Passage Key	Manatee
Caloosahatchee	Lee

Lake Woodruff	Volusia
St. Mark's	Jefferson/Wakulla
National Key Deer	Monroe
Great White Heron	Monroe
Key West	Monroe
Pine Island	Lee
Matlacha Pass	Lee
J. N. "Ding" Darling	Lee
Island Bay	Charlotte
Cedar Keys	Levy
Chinsegut	Hernando
Merritt Island	Volusia/Brevard
Egmont Key	Pinellas
St. Johns	Brevard

(c) Waters within State Parks or Recreation Areas

State Park or Recreation Area	County
Alfred B. Maclay State Ornamental Garden	Leon
Anastasia State Recreation Area	St. Johns
Bahia Honda State Recreation Area	Monroe
Basin Bayou State Recreation Area	Walton
Bill Baggs Cape Florida State Recreation Area	Dade
Blackwater River State Park	Santa Rosa
Blue Springs State Recreation Area	Volusia
Caladesi Island State Park	Pinellas
Chekika State Recreation Area	Dade
Collier—Seminole State Park	Collier
Dead Lakes State Recreation Area	Gulf
Eden State Ornamental Garden	Walton
Falling Waters State Recreation Area	Washington
Faver—Dykes State Park	St. Johns
Flagler Beach State Recreation Area	Flagler
Florida Caverns State Park	Jackson
Fort Clinch State Park	Nassau
Fort Pickens State Park	Escambia
Fred Gannon Rocky Bayou State Recreation Area	Okaloosa
Grayton Beach State Recreation Area	Walton
Highlands Hammock State Park	Highlands/Hardee
Hillsborough River State Park	Hillsborough
Hontoon Island State Park	Volusia/Lake
Hugh Taylor Birch State Recreation Area	Broward
Ichetucknee Springs State Park	Columbia
John Pennekamp Coral Reef State Park	Monroe
John U. Lloyd Beach State Recreation Area	Broward
Jonathan Dickinson State Park	Martin
Lake Griffin State Recreation Area	Lake
Lake Kissimmee	Polk
Little Talbot Island State Park	Duval
Long Key State Recreation Area	Monroe
Manatee Springs State Park	Levy
Mike Roess Gold Head Branch State Park	Clay
Myakka River State Park	Manatee/Sarasota
Ochlockonee River State Park	Wakulla
O'Leno State Park	Alachua/Columbia
Oscar Scherer Recreation Area	Sarasota
Pahokee State Recreation Area	Palm Beach
Pepper Park State Recreation Area	St. Lucie
Ponce de Leon Springs State Recreation Area	Holmes/Walton
Ravine State Ornamental Garden	Putnam
St. Andrews State Recreation Area	Bay
Sebastian Inlet State Recreation Area	Indian River
Suwannee River State Park	Hamilton/Madison/Suwannee
Three Rivers State Recreation Area	Jackson
T. H. Stone Memorial St. Joseph Peninsula State Park	Gulf
Tomoka State Park	Volusia
Torreya State Park	Liberty
Washington Oaks State Ornamental Garden	Flagler
Wekiva Springs State Park	Orange/Seminole

(d) Waters Within Environmentally Endangered Lands Which Have Been Purchased by the State.

Environmentally Endangered Lands	County
Weedon Island	Pinellas
Fakahatchee Strand/Big Cypress Bend	Collier
Volusia Recharge Area	Volusia
River Rise (McLeod Ranch)	Osceola
San Felasco Hammock	Alachua
Three Lakes Ranch	Osceola
Lower Apalachicola River Tracts	Franklin/Gulf
Palm Beach County Everglades Tract	Palm Beach
Paynes Prairie State Preserve Addition	Alachua
Lower Wekiva River Corridor	Lake/Seminole
Cayo Costa North Captiva Islands	Lee
Charlotte Harbor	Charlotte
Big Cypress National Preserve	Collier/Dade/Monroe
Tosohatchee State Preserve	Orange

(e) Waters within National Seashores.

National Seashores	County
Gulf Islands	Escambia/Santa Rosa
Canaveral	Brevard/Volusia

(f) Waters within State Aquatic Preserves

Aquatic Preserves	County
Cape Romano—Ten Thousand Islands	Collier
Nassau River—St. Johns River Marshes	Nassau/Duval
St. Joseph Bay	Gulf
Apalachicola Bay	Franklin
North Fork, St. Lucie	St. Lucie/Martin
Intracoastal Waters—Jensen Beach to Jupiter Inlet	Martin/Palm Beach
Loxahatchee River—Lake Worth Creek	Martin/Palm Beach
Fort Clinch State Park	Nassau
Cockroach Bay	Hillsborough
Boca Ciega Bay	Pinellas
Caladesi Island	Pinellas
St. Martin's Marsh	Citrus
Alligator Harbor	Franklin
Biscayne Bay	Dade/Monroe
Estero Bay	Lee
Pellicer Creek	St. Johns/Flagler
Tomoka Marsh	Volusia/Flagler
Coupon Bight	Monroe
Lignumvitae Key	Monroe
Cape Haze—Gasparilla Sound	Charlotte/Lee
Pine Island Sound	Lee
Matlacha Pass	Lee
Yellow River Marsh	Santa Rosa
Fort Pickens State Park	Escambia
Lake Jackson	Leon
St. Andrews State Park	Bay
Rocky Bayou State Park	Okaloosa
Mosquito Lagoon	Volusia/Brevard
Banana River	Brevard
Indian River Malabar to Sebastian	Brevard/Indian River
Indian River Vero Beach to Ft. Pierce	Indian River/St. Lucie
Pinellas County	Pinellas

(g) Special Waters

Ochlockonee River
Wakulla River
St. Marks River—except that part between Rattlesnake Branch and the confluence of the St. Marks and Wakulla Rivers.
Wacissa River
Aucilla River
Apalachicola River south of northern Gulf County Line
Chipola River
Shoal River
Choctawhatchee River
Blackwater River
Perdido River
Suwannee River

(h) Waters within National Monuments

National Monuments	County
Biscayne	Dade

(i) Waters within National Marine Sanctuaries

Marine Sanctuaries	County
Key Largo Coral Reef	Monroe

(j) Waters within National Estuarine Sanctuaries

National Estuarine Sanctuaries	County
Rookery Bay	Collier County

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804, 403.805 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.101, 404.141, 403.182, 403.502, 403.702, 403.708 FS. History—New 3-1-79, Amended 5-10-80.

17-3.06 Thermal Surface Water Criteria.

(1) All discharges or proposed discharges of heated water into receiving bodies of water (RBW) which are controlled by the State shall be subjected to a thorough study to assess the consequences of the discharge upon the environment. The State shall be divided into two general climatological zones: Peninsular Florida, which varies from tropical in nature to temperate but is modified by the peninsular configuration and is the area south of latitude 30°N (excluding Gulf and Franklin Counties): and Northern Florida which is temperate and continental and is the area above latitude 30°N plus the portions of Gulf and Franklin Counties which lie below 30°N.

(a) Heated water discharges existing on July 1, 1972:

1. Shall not increase the temperature of the RBW so as to cause substantial damage or harm to the aquatic life or vegetation therein or interfere with beneficial uses assigned to the RBW.

2. Shall be monitored by the discharger to ensure compliance with this rule, and

3. If the Department, pursuant to notice and opportunity for hearing, finds by preponderant evidence that a discharge has caused substantial damage, it may require conversion of such discharge to offstream cooling or approved alternate methods. In making determinations regarding such conversions, the Department may consider:

a. The nature and extent of the existing damage;

b. The projected lifetime of the existing discharge;

c. Any adverse economic and environmental (including non-water quality) impacts which would result from such conversion; and

d. Such other factors as may be appropriate.

(b) Heated water sources proposed for future discharges into RBW controlled by the State shall not increase the water temperature by more than the monthly temperature limits prescribed for the particular type and location of the RBW. New sources shall include all expansions, modifications, alterations, replacements, or repairs which result in an increased output of ten percent (10%) or more of the level of energy production which existed on the date this rule became effective. Water temperatures shall be measured by procedures approved by the Florida Department of Environmental Regulation (DER). In all cases where a temperature rise above ambient is allowed and a maximum RBW temperature is also prescribed, the lower of the two limitations shall be the control temperature.

(c) Definitions.

(i) Ambient (natural) temperature of a RBW shall mean the existing temperature of the receiving water at a location which is unaffected by manmade thermal discharges and a location which is also of a depth and exposure to winds and currents which typify the most environmentally stable portions of the RBW.

(ii) Coastal waters shall be all waters in the State which are not classified as fresh waters or as open waters.

(iii) A cooling pond is a body of water enclosed by natural or constructed restraints which has been approved by the Florida DER for purposes of controlling heat dissipation from thermal discharges.

(iv) An existing heat source is any thermal discharge (a) which is presently taking place, or (b) which is under construction or for which a construction or operation permit has been issued prior to the effective date of this rule.

(v) Fresh waters shall be all waters of the State which are contained in lakes and ponds, or are in flowing streams above the zone in which tidal actions influence the salinity of the water and where the concentration of chloride ions is normally less than 1500 milligrams per liter.

(vi) Open waters shall be all waters in the State extending seaward from the most seaward 18-foot depth contour line (three-fathom bottom depth contour) which is offshore from any island; exposed or submerged bar or reef; or mouth of any embayment or estuary which is narrowed by headlands. Contour lines shall be determined from Coast and Geodetic Survey Charts.

(vii) The point of discharge (POD) for a heated water discharge shall be primarily that point at which the effluent physically leaves its carrying conduit (open or closed), and discharges into the waters of the state, or, in the event it is not practicable to measure temperature at the end of the discharge conduit, a specific point designated by the Florida DER for that particular thermal discharge.

(viii) Heated water discharges are the effluents from commercial or industrial activities or processes in which water is used for the purpose of transporting waste heat, and which constitute heat sources of one million British Thermal Units per hour (1,000,000 BTU/HR.), or greater.

(ix) Blowdown shall mean the minimum discharge of recirculating cooling water for the purpose of discharging materials contained in the water, the further buildup of which could cause concentrations in amounts exceeding limits established by best engineering practice.

(x) Recirculating cooling water shall mean water which is used for the purpose of removing waste heat and then passed through a cooling system for the purpose of removing such heat from the water and then, except for blowdown, is used again to remove waste heat.

(d) Monthly and Maximum Temperature Limits

(i) Fresh Waters — Heated water with a temperature at the POD more than 5°F higher than the ambient (natural) temperature of any stream shall not be discharged into such stream. At all times under all conditions of stream flow the discharge temperature shall be controlled so that at least two-thirds (2/3) of the width of the stream's surface remains at ambient (natural) temperature. Further, no more than one-fourth (1/4) of the cross-section of the stream at a traverse perpendicular to the flow shall be heated by the discharge. Heated water with a temperature at the POD more than 3°F higher than the ambient (natural) temperature of any lake or reservoir shall not be discharged into such lake or reservoir. Further, no heated water with a temperature above 90°F shall be discharged into any fresh waters in Northern Florida regardless of the ambient temperature of the RBW. In Peninsular Florida, heated waters above 92°F shall not be discharged into fresh waters.

(ii) Coastal Waters — Heated water with a temperature at the POD more than 2°F higher than the ambient (natural) temperature of the RBW shall not be discharged into coastal waters in any zone during the months of June, July, August, and September. During the remainder of the year, heated water with a temperature at the POD more than 4°F higher than the ambient (natural) temperature of the RBW shall not be discharged into coastal waters in any zone. In addition, during June, July, August, and September, no heated water with a temperature above 92°F shall be discharged into coastal waters. Further, no heated water with a temperature above 90°F shall be discharged into coastal waters during the period October thru May.

(iii) Open Waters —Heated water with a temperature at the POD up to 17°F above ambient (natural) temperature of the RBW may be discharged from an open or closed conduit into open waters under the following restraints: The surface temperature of the RBW shall not be raised to more than 97°F and the POD must be sufficient distance offshore to ensure that the adjacent coastal waters are not heated beyond the temperatures permitted in such waters.

(iv) Cooling Ponds — The temperature for heated water discharged from a cooling pond shall be measured at the POD from the pond, and the temperature limitation shall be that specified for the RBW.

(e) General.

(i) Daily and seasonal temperature variations that were normal to the RBW before the addition of heat from other than natural causes shall be maintained.

(ii) Recapitulation of temperature limitations prescribed above:

ZONE	STREAMS	LAKES	COASTAL		OPEN
			SUMMER	REMAINDER	
NORTH.	90°F Max.	90°F Max.	92°F Max.	90°F Max.	97°F Max.
	AM. +5°F	AM. +3°F	AM. +2°F	AM. +4°F	AM. +17°
PENIN.	92°F Max.	92°F Max.	92°F Max.	90°F Max.	97°F Max.
	AM. +5°F	AM. +3°F	AM. +2°F	AM. +4°F	AM. +17°

(f) Upon application on a case by case basis, the Department may establish a zone of mixing beyond the POD to afford a reasonable opportunity for dilution and mixture of heated water discharges with the RBW, in the following manner:

(i) Zones of mixing for thermal discharges from non-recirculated cooling water systems and process water systems of new sources shall be allowed if supported by a demonstration, as provided in Section 316(a), Public Law 92-500 and regulations promulgated thereunder, including 40 C.F.R. Part 122, by an applicant that the proposed mixing zone will assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made and such demonstration has not been rebutted. It is the intent of the Commission that to the extent practicable, proceedings under this provision should be conducted jointly with proceedings before the federal government under Section 316(a), Public Law 92-500.

(ii) Zones of mixing for blowdown discharges from recirculated cooling water systems, and for discharges from non-recirculated cooling water systems of existing sources, shall be established on the basis of the physical and biological characteristics of the RBW.

(iii) When a zone of mixing is established pursuant to this Subsection 17-3.05(1)(f), F.A.C., any otherwise applicable temperature limitations contained in Section 17-3.05(1), F.A.C., shall be met at its boundary; however, the Department may also establish maximum numerical temperature limits to be measured at the POD and to be used in lieu of the general temperature limits in section 17-3.05(1), F.A.C., to determine compliance by the discharge with the established mixing zone and the temperature limits in Section 17-3.05(1), F.A.C.

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502.403.702, 403.708 FS. History—Formerly 28-5.02, 17-3.02, Amended 10-28-70, Amended and Renumbered 3-1-79.

17-3.051 Minimum Criteria for All Waters at All Times and All Places. All waters of the State shall at all places and at all times be free from:

(1) Domestic, industrial, agricultural, or other man-induced non-thermal components of discharges which, alone or in combination with other substances or in combination with other components of discharges (whether thermal or non-thermal):

(a) Settle to form putrescent deposits or otherwise create a nuisance; or

(b) Float as debris, scum, oil, or other matter in such amounts as to form nuisances; or

(c) Produce color, odor, taste, turbidity, or other conditions in such degree as to create a nuisance; or

(d) Are acutely toxic; or

(e) Are present in concentrations which are carcinogenic, mutagenic, or teratogenic to human beings or to significant, locally occurring, wildlife or aquatic species; or

(f) Pose a serious danger to the public health, safety, or welfare.

(2) Thermal components of discharges which, alone, or in combination with other discharges or components of discharges (whether thermal or non-thermal):

(a) Produce conditions so as to create a nuisance; or

(b) Do not comply with applicable provisions of Subsection 17-3.05(1), F.A.C.

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708 FS. History—Formerly 28-5.02, Formerly 17-3.02, Amended 10-28-78, Amended and Renumbered 3-1-79.

17-3.06 Classification of Waters, Usage.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101(1) FS. History—Formerly 28-5.06, Amended and Renumbered as 17-3.081, 3-1-79.

17-3.061 Surface Waters: General Criteria.

(1) The criteria of surface water quality hereinafter provided shall be applied to all surface waters except within zones of mixing.

(2) A violation of any of the following surface water quality criteria constitutes pollution. Additional, more stringent or alternative criteria than indicated in this paragraph may, however, be specified for individual classes of water under Sections 17-3.091, 17-3.111, 17-3.121, 17-3.131, and 17-3.141 of this Chapter.

(a) Arsenic — shall not exceed 0.05 milligrams per liter.

(b) BOD — shall not be increased to exceed values which would cause dissolved oxygen to be depressed below the limit established for each class and, in no case shall it be great enough to produce nuisance conditions.

(c) Chlorides — in predominantly marine waters, the chloride content shall not be increased more than ten percent (10%) above normal background chloride content. Normal daily and seasonal fluctuations in chloride levels shall be maintained.

(d) Chromium — shall not exceed 0.50 milligrams per liter hexavalent or 1.0 milligrams per liter total chromium in effluent discharge and shall not exceed 0.05 milligrams per liter total chromium after reasonable mixing in the receiving water.

(e) Copper — shall not exceed 0.5 milligrams per liter.

(f) Detergents — shall not exceed 0.5 milligrams per liter.

(g) Fluorides — shall not exceed 10.0 milligrams per liter as fluoride ion.

(h) Lead — shall not exceed 0.05 milligrams per liter.

(i) Nutrients — The discharge of nutrients shall continue to be limited as needed to prevent violations of other standards contained in this Chapter. Man-induced nutrient enrichment (total nitrogen or total phosphorus) shall be considered degradation in relation to the provisions of Section 3.041 of this Chapter and Section 17-4.242, F.A.C.

(j) Oils and Greases:

1. Dissolved or emulsified oils and greases shall not exceed 5.0 milligrams per liter.

2. No undissolved oil, or visible oil defined as iridescence, shall be present so as to cause taste or odor, or otherwise interfere with the beneficial use of waters.

(k) pH — pH of receiving waters shall not be caused to vary more than one (1.0) unit above or below natural background pH of the water; the lower value shall not be less than six (6.0) and the upper value shall not be more than eight and one half (8.5).

(l) Phenolic compounds as listed — Chlorinated phenols including trichlorophenols; chlorinated creosols; 2-chlorophenol; 2, 4 dichlorophenol and pentachlorophenol; 2, 4-dinitrophenol; phenol — shall not exceed 1.0 micrograms per liter unless higher values are shown not to be chronically toxic. Such higher values shall be approved in writing by the Secretary. Phenolic compounds other than those produced by the natural decay of plant material, listed or unlisted, shall not taint the flesh of edible, fish or shellfish or produce objectionable taste or odor in a drinking water supply.

(m) Radioactive Substances:

1. Combined radium 226 and 228 — shall not exceed five picocuries per liter.

2. Gross alpha particle activity including radium 226, but excluding radon and uranium — shall not exceed fifteen picocuries per liter.

(n) Specific Conductance — shall not be increased more than 100% above background levels or to a maximum level of 500 micromhos per centimeter in those surface waters in which the specific conductance of the water at the surface is less than 500 micromhos per centimeter; and shall not be increased more than 50% above background level or to a maximum level of 5,000 micromhos per centimeter for predominantly freshwaters as defined in Section 17-3.021 in which the specific conductance of the water at the surface is equal to or greater than 500 micromhos per centimeter.

(o) Substances in concentrations which injure, are chronically toxic to, or produce adverse physiological or behavioral response in humans, animals, or plants—none shall be present.

(p) Substances in concentrations which result in the dominance of nuisance species—none shall be present.

(q) Turbidity — shall not exceed fifty (50) Jackson Units above natural background as related to a standard candle turbidimeter.

(r) Zinc — shall not exceed 1.0 milligrams per liter.

(3) Dissolved Oxygen: Notwithstanding the specific numerical criteria for individual classes of water under Subsections 17-3.091(13), 17-3.111(11), 17-3.121(14), 17-3.131(6), and 17-3.141(2), Florida Administrative Code, the Department recognizes that, in certain bodies of water or segments of water bodies, the dissolved oxygen may be below the applicable criteria at certain times due to man-induced causes which cannot be controlled or abated with technology or management practices including zero discharge, or due to natural background conditions. Under such conditions, the background levels shall be the criteria; however, daily and seasonal fluctuations shall be maintained. This level may be determined only after public notice and opportunity for public hearing, and consideration of the factors listed in Subsection 17-3.031(2), Florida Administrative Code, and specified in a Department permit; or the level may be determined in accordance with 17-3.031, Florida Administrative Code.

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.181, 403.502, 403.702, 403.708 FS. History—Formerly 17-3.05(1) and (2), Amended 2-12-75, 8-26-75, 6-10-76, Amended and Renumbered 3-1-79, Amended 10-2-80.

17-3.07 Criteria: Class I Waters — Public Water Supply.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.07, Amended 7-3-73, Amended and Renumbered as 17-3.091, 3-1-79.

17-3.071 Groundwaters: General Criteria.

(1) The groundwater quality standards in this Chapter contain water quality criteria which are applicable to each classification of receiving groundwater outside of a zone of discharge established pursuant to Section 17-4.245, Florida Administrative Code.

(2) In addition to any technology-based groundwater effluent limitations required by Department rule, the Department may also specify water quality-based effluent limitations to assure that water quality criteria will be met.

(3) The groundwater quality criteria specified in Section 17-3.101 or 17-3.151, F.A.C., shall be applied to all groundwaters except within zones of discharge.

(4) A violation of any groundwater criterion contained in Section 17-3.101 or 17-3.151, F.A.C., constitutes pollution.

(5) These groundwater criteria and other provisions relating to groundwater are an initial but necessary step by the Department in a field in which there exists limited knowledge. In an effort to further refine the State's groundwater quality policy, there is hereby created a Groundwater Quality Task Force which shall meet regularly and report findings and suggestions regarding

these groundwater quality standards and associated rule provisions. Said Task Force shall be composed of sixteen persons, with one representative from each of the five water management districts; five representatives from affected industry, five from environmental groups or other groups the Chairman of the Commission shall elect to invite to participate; and one representative from the Department who shall act as Chairman of that Task Force. In developing the proposed revisions, the Task Force shall consider the various geologic and hydrologic provinces of the State; the most beneficial uses of the groundwaters of the State; criteria necessary to protect those uses; and the integration of groundwater quality and quantity management. Said Task Force shall provide written status reports to the Commission. No later than January 31, 1982, the Commission shall consider at a public hearing any proposed revisions.

(6) The Department must attempt to protect the most beneficial uses of the groundwaters of the State to assure continued availability of this invaluable resource. To achieve the necessary protection, specific standards reflecting these beneficial uses are set forth in these Chapters. However, recognizing the complexities and concerns of implementing groundwater standards, the Commission shall review the groundwater standards contained herein, together with the report of the Task Force established pursuant to (5) above at a public hearing no later than January 31, 1982. Unless the Commission affirmatively determines that the groundwater standards remain appropriate, or amends them as it deems necessary, all such groundwater standards shall be repealed effective January 31, 1982. In the event of repeal of groundwater standards pursuant to this Subsection, any regulations applicable to groundwaters at the date of the adoption of this section shall apply. Permits issued prior to January 31, 1982 in accordance with such groundwater standards shall remain in full force and effect until such permits expire, are modified, or revoked in accordance with applicable rules and statutes.

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708 FS. History—New 3-1-79, Amended 12-27-79, 1-12-81.

17-3.08 Criteria: Class II Waters — Shellfish Propagation and Harvesting.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.08, Amended 6-10-72, 8-30-72, 7-3-73, Amended and Renumbered as 17-3.111, 3-1-79.

17-3.081 Classification of Waters, Usage, Reclassification.

(1) All waters of the State have been classified according to designated uses as follows:

CLASS I-A	Potable Water Supplies — Surface Waters
CLASS I-B	Potable and Agricultural Water Supplies and Storage — Groundwaters
CLASS II	Shellfish Propagation or Harvesting — Surface Waters
CLASS III	Recreation, Propagation and Management of Fish and Wildlife — Surface Waters
CLASS IV	Agricultural Water Supplies — Surface Waters
CLASS V-A	Navigation, Utility and Industrial Use — Surface Waters
CLASS V-B	Freshwater Storage, Utility and Industrial — Use — Groundwaters

(2) Classification of a water body according to a particular designated use or uses does not preclude utilization of the water for other purposes.

(3) The specific water quality criteria corresponding to each water classification are listed in Sections 17-3.091 to 17-3.151, F.A.C., inclusive.

(4) Water quality classifications are arranged in order of the degree of protection required, with Class I water having generally the most stringent water quality criteria and Class V the least.

(5) Criteria applicable to a classification are designed to maintain the minimum conditions necessary to assure the suitability of water for the designated use of the classification. In addition, applicable criteria are generally adequate to maintain minimum conditions required for the designated uses of less stringently regulated classifications. Therefore, unless clearly inconsistent with the criteria applicable, the designated uses of less stringently regulated classifications shall be deemed to be included within the designated uses of more stringently regulated classifications.

(6) Any person regulated by the Department or having a substantial interest in this Chapter may seek reclassification of waters of the State by filing a petition with the Secretary in the form required by Section 17-1.24, F.A.C.

(7) A petition for reclassification shall reference and be accompanied by the information necessary to support the affirmative finding required in this Section to support the proposed reclassification.

(8) All reclassifications of waters of the State shall be adopted, after public notice and public hearing, only upon an affirmative finding by the Environmental Regulation Commission that:

(a) The proposed reclassification will establish the present and future most beneficial use of the waters; and

(b) Such a reclassification is clearly in the public interest.

(9) Reclassification of waters of the State which establishes more stringent criteria than presently established by this Chapter shall be adopted, only upon additional affirmative finding by the Environmental Regulation Commission that the proposed designated use is attainable, upon consideration of environmental, technological, social, economic, and institutional factors.

Specific Authority 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.504, 403.702, 403.708 FS. History—Formerly 28-5.06, 17-3.06, Amended and Renumbered 3-1-79.

17-3.09 Criteria: Class III Waters — Recreation Propagation and Management of Fish and Wildlife.

Specific Authority 403.061 FS. 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.09, Amended 6-10-72, 8-30-72, 7-3-73, Amended and Renumbered as 17-3.121, 3-1-79.

17-3.091 Criteria: Class I-A Waters — Potable Water Supplies — Surface Waters. The criteria listed below are for surface waters designated for use as a potable supply. The standards contained in Sections 17-3.051 and 17-3.061, F.A.C., shall apply to all waters of this class, unless more stringent levels are specified below. The following criteria are to be applied except within zones of mixing:

(1) Alkalinity — shall not be depressed below 20 milligrams per liter as $CaCO_3$.

(2) Ammonia (un-ionized) — shall not exceed 0.02 milligrams per liter.

(3) Bacteriological Quality — Coliform group shall notexceed 1,000 per 100 milliliters as a monthly average,

using either most probable number (MPN) or membrane filter (MF) counts; nor exceed 1,000 per 100 milliliters in more than 20% of the samples examined during any month; nor exceed 2,400 per 100 milliliters (MPN or MF count) at any time. Based on a minimum of five samples taken over a 30-day period, the fecal coliform bacterial level shall not exceed 200 per 100 milliliters as computed by the log mean, nor shall more than 10% of the total samples taken during any 30-day period exceed 400 per 100 milliliters.

(4) Barium — shall not exceed 1 milligrams per liter.

(5) Beryllium — shall not exceed 0.011 milligrams per liter in waters with a hardness equal to or less than 150 (in milligrams per liter of $CaCO_3$), and shall not exceed 1.10 milligrams per liter in harder waters.

(6) Biological Integrity — the Shannon-Weaver diversity index of benthic macroinvertebrates shall not be reduced to less than 75% of background levels as measured using organisms retained by a U.S. Standard No. 30 sieve and collected and composited from a minimum of three Hester-Dendy type artificial substrate samplers of 0.10 to 0.15 square meters area each, incubated for a period of four weeks.

(7) Cadmium — shall not exceed 0.8 micrograms per liter in a water with a hardness (in milligrams per liter of $CaCO_3$) equal to or less than 150, and shall not exceed 1.2 micrograms per liter in harder waters.

micrograms per liter in harder waters.

(8) Chlorides — shall not exceed two hundred fifty (250) milligrams per liter.

(9) Chlorine (total residual) — shall not exceed 0.01 milligrams per liter.

(10) Copper — shall not exceed 30 micrograms per liter.

(11) Cyanide — shall not exceed 5.0 micrograms per liter.

(12) Dissolved Gases — shall not exceed 110% of the saturation value for gases at the existing atmospheric and hydrostatic pressure.

(13) Dissolved Oxygen — shall not be less than 5 milligrams per liter. Normal daily and seasonal fluctuations above this level shall be maintained.

(14) Dissolved Solids — not to exceed five hundred (500) milligrams per liter as a monthly average or exceed one thousand (1,000) milligrams per liter at any time.

(15) Fluorides — shall not exceed 1.5 milligrams per liter.

(16) Iron — shall not exceed 0.3 milligrams per liter.

(17) Lead — shall not exceed .03 milligrams per liter.

(18) Mercury — shall not exceed 0.2 micrograms per liter.

(19) Nickel — shall not exceed 0.1 milligrams per liter.

(20) Nitrate — shall not exceed 10 milligrams per liter as N or that concentration determined in (21) below.

(21) Nutrients — In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna.

(22) Pesticides and Herbicides:

(a) Aldrin plus Dieldrin — shall not exceed 0.003 micrograms per liter.

(b) Chlordane — shall not exceed 0.01 micrograms per liter.

(c) 2-4-D — shall not exceed 100 micrograms per liter.

(d) 2,4,5-TP — shall not exceed 10 micrograms per liter.

(e) DDT — shall not exceed 0.001 micrograms per liter.

(f) Demeton — shall not exceed 0.1 micrograms per liter.

(g) Endosulfan — shall not exceed 0.003 micrograms per liter.

(h) Endrin — shall not exceed 0.004 micrograms per liter.

(i) Guthion — shall not exceed 0.01 micrograms per liter.

(j) Heptachlor — shall not exceed 0.001 micrograms per liter.

(k) Lindane — shall not exceed 0.01 micrograms per liter.

(l) Malathion — shall not exceed 0.1 micrograms per liter.

(m) Methoxychlor — shall not exceed 0.03 micrograms per liter.

(n) Mirex — shall not exceed 0.001 micrograms per liter.

(o) Parathion — shall not exceed 0.04 micrograms per liter.

(p) Toxaphene — shall not exceed 0.005 micrograms per liter.

(23) Phthalate Esters — shall not exceed 3.0 micrograms per liter.

(24) Polychlorinated Biphenyls — shall not exceed 0.001 micrograms per liter.

(25) Selenium — shall not exceed 0.01 milligrams per liter.

(26) Silver — shall not exceed 0.07 micrograms per liter.

(27) Transparency — the depth of the compensation point for photosynthetic activity shall not be reduced by more than 10% as compared to the natural background value.

(28) Zinc — shall not exceed 0.03 milligrams per liter.

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708 FS. History—Formerly 28-6.07, 17-3.07, Amended 7-3-73, Amended and Renumbered 3-17-9.

17-3.10 Criteria: Class IV Waters — Agricultural and Industrial Water Supply.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.10, Amended 6-10-72, 8-30-72, Amended and Renumbered as 17-3.131, 3-1-79.

17-3.101 Criteria: Class I-B Waters — Potable and Agricultural Water Supplies and Storage — Groundwaters. As stated in Section 17-3.161, F.A.C. all groundwaters with total dissolved solids levels of less than 10,000 milligrams per liter are classified as Class I-B. The criteria contained in Section 17-3.071, F.A.C., apply to all waters in this classification unless more stringent levels are specified below. The criteria contained in Section 17-3.051(1), F.A.C., and the following criteria are to be applied except within zones of discharge:

(1) Arsenic — shall not exceed 0.05 milligrams per liter.

(2) Barium — shall not exceed 1.0 milligrams per liter.

(3) Cadmium — shall not exceed 0.01 milligrams per liter.

(4) Chromium — shall not exceed 0.05 milligrams per liter.

(5) Endrin — shall not exceed 0.2 micrograms per litre.

(6) Fluorides — shall not exceed 1.5 milligrams per liter unless background information indicates prior existence of higher levels than 1.5 milligrams per liter, in which case those higher levels are not to be exceeded.

(7) Lindane — shall not exceed 0.004 milligrams per liter.

(8) Lead — shall not exceed 0.05 milligrams per liter.

(9) Mercury — shall not exceed 0.002 milligrams per liter.

(10) Methoxychlor — shall not exceed 0.1 milligrams per liter.

(11) Nitrate — shall not exceed 10.0 milligrams per liter as N.

(12) Radioactive Substances:

(a) Combined radium 226 and 228 — shall not exceed five picocuries per liter.

(b) Gross alpha particle activity including radium 226, but excluding radon and uranium — shall not exceed fifteen picocuries per liter.

(13) Selenium — shall not exceed 0.01 milligrams per liter.

(14) Silver — shall not exceed 0.05 milligrams per liter.

(15) Substances shall not be present in concentrations which injure, are chronically toxic to, or produce significant adverse physiological or behavioral responses in humans, animals, or plants.

(16) 2, 4-D — shall not exceed 0.1 milligrams per liter.

(17) 2, 4, 5-TP — shall not exceed 0.01 milligrams per liter.

(18) Toxaphene — shall not exceed 0.005 milligrams per liter.

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708 FS. History—New 3-1-79.

17-3.11 Criteria: Class V Waters — Navigation, Utility, and Industrial Use.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 FS. History—Formerly 28-5.11, Amended and Renumbered at 17-3.141, 3-1-79.

17-3.111 Criteria: Class II Waters — Shellfish Propagation or Harvesting — Surface Waters. The criteria listed below are for surface waters classified as Class II. The standards contained in Section 17-3.051 and 17-3.061, F.A.C., also shall apply to all waters of this class, unless additional or more stringent levels are specified below. The following criteria are to be applied except within zones of mixing:

(1) Aluminum — shall not exceed 1.5 milligrams per liter.

(2) Antimony — shall not exceed 0.2 milligrams per liter.

(3) Bacteriological Quality — the maximum coliform MPN (Most Probable Number) of water shall not exceed seventy (70) per hundred (100) milliliters, and not more than ten percent (10%) of the samples shall exceed a MPN of two hundred and thirty (230) per one hundred (100) milliliters. The fecal coliform bacterial level shall not exceed a median value of 14 MPN per 100 milliliters with not more than ten percent (10%) of the samples exceeding 43 WPN per 100 milliliters.

(4) Biological Integrity — the Shannon-Weaver diversity index of benthic macroinvertebrates shall not be reduced to less than 75% of established background levels as measured using organisms retained by a U.S. Standard No. 30 sieve and collected and composited from a minimum of three natural substrate samples, taken with Ponar type samplers with minimum sampling areas of 225 square centimeters.

(5) Bromine and Bromates — free (molecular) bromine shall not exceed 0.1 milligrams per liter, and bromates shall not exceed 100 milligrams per liter.

(6) Cadmium — shall not exceed 5.0 micrograms per liter.

(7) Chlorine (total residual) — shall not exceed 0.01 milligrams per liter.

(8) Copper — shall not exceed 0.015 milligrams per liter.

(9) Cyanide — shall not exceed 5.0 micrograms per liter.

(10) Dissolved Gases — shall not exceed 110% of the saturation value for gases at the existing atmospheric and hydrostatic pressures.

(11) Dissolved Oxygen — the concentration in all waters shall not average less than 5 milligrams per liter in a 24-hour period and shall never be less than 4 milligrams per liter. Normal daily and seasonal fluctuations above these levels shall be maintained.

(12) Fluorides — shall not exceed 1.5 milligrams per liter.

(13) Iron — shall not exceed 0.3 milligrams per liter.

(14) Manganese — shall not exceed 0.1 milligrams per liter.

(15) Mercury — shall not exceed 0.1 micrograms per liter.

(16) Nickel — shall not exceed 0.1 milligrams per liter.

(17) Nutrients — In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna.

(18) Odor — threshold odor number shall not exceed 24 at 60°C as a daily average.

(19) Pesticides and Herbicides:

(a) Aldrin plus Dieldrin — shall not exceed 0.003 micrograms per liter.

(b) Chlordane — shall not exceed 0.004 micrograms per liter.

(c) DDT — shall not exceed 0.001 micrograms per liter.

(d) Demeton — shall not exceed 0.1 micrograms per liter.

(e) Endosulfan — shall not exceed 0.001 micrograms per liter.

(f) Endrin — shall not exceed 0.004 micrograms per liter.

(g) Guthion — shall not exceed 0.01 micrograms per liter.

(h) Heptachlor — shall not exceed 0.001 micrograms per liter.

(i) Lindane — shall not exceed 0.004 micrograms per liter.

(j) Malathion — shall not exceed 0.1 micrograms per liter.

(k) Methoxychlor — shall not exceed 0.03 micrograms per liter.

(l) Mirex — shall not exceed 0.001 micrograms per liter.

(m) Parathion — shall not exceed 0.04 micrograms per liter.

(n) Toxaphene — shall not exceed 0.005 micrograms per liter.

(20) pH — pH shall not be caused to vary more than one (1.0) unit above or below normal pH of coastal waters as defined in Section 17-3.05(1)(c), F.A.C., and not more than two-tenths (0.2) unit above or below normal pH of open waters as defined in Section 17-3.05(1)(c), F.A.C., and the lower value shall not be less than six and one-half (6.5) and the upper value not more than eight and one-half (8.5).

(21) Phosphorus (elemental) — shall not exceed 0.1 micrograms per liter.

(22) Polychlorinated Biphenyls — shall not exceed 0.001 micrograms per liter.

(23) Selenium — shall not exceed 0.025 milligrams per liter.

(24) Silver — shall not exceed 0.05 micrograms per liter.

(25) Transparency — the depth of the compensation point for photosynthetic activity shall not be reduced by more than 10% as compared to the natural background value.

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708 FS. History—Formerly 28-5.08, 17-3.08, Amended 6-10-72, 8-30-72, 7-3-73, Amended and Renumbered 3-1-79.

17-3.12 Definitions.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.101 F S. History—Formerly 28-5.12, Amended and Renumbered as 17-3.021, 3-1-79.

17-3.121 Criteria: Class III Waters — Recreation — Propagation and Management of Fish and Wildlife — Surface Waters. The criteria listed below are for surface waters classified as Class III. The standards contained in Sections 17-3.051 and 17-3.061, F.A.C., also apply to all waters of this classification unless additional or more stringent criteria are specified below. The following criteria are to be applied except within zones of mixing.

(1) Alkalinity — shall not be depressed below 20 milligrams per litre as $CaCO_3$ in predominantly fresh waters.

(2) Aluminum — shall not exceed 1.5 milligrams per liter in predominantly marine waters.

(3) Ammonia (un-ionized) — shall not exceed 0.02 milligrams per liter in predominantly fresh waters.

(4) Antimony — shall not exceed 0.2 milligrams per liter in predominantly marine waters.

(5) Bacteriological Quality — fecal coliform bacteria shall not exceed a monthly average of 200 per 100 ml of sample, nor exceed 400 per 100 ml of sample in 10 percent of the samples, nor exceed 800 per 100 ml on any one day, nor exceed a total coliform bacteria count of 1,000 per 100 ml as a monthly average, nor exceed 1,000 per 100 ml in more than 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml at any time. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30 day period. Either MPN or MF counts may be utilized.

(6) Beryllium — in predominantly fresh waters shall not exceed 0.011 milligrams per liter in waters with a hardness equal to or less than 150 (in milligrams per liter of $CaCO_3$) and shall not exceed 1.10 milligrams per liter in harder waters.

(7) Biological Integrity — the Shannon-Weaver diversity index of benthic macroinvertebrates shall not be reduced to less than 75 percent of established background levels as measured using organisms retained by a U.S. Standard No. 30 sieve and, in predominantly fresh waters, collected and composited from a minimum of three Hester-Dendy type artificial substrate samplers of 0.10 to 0.15 m^2 area each, incubated for a period of four weeks; and, in predominantly marine waters, collected and composited from a minimum of three natural substrate samples, taken with Ponar type samplers with minimum sampling area of 225 square centimeters.

(8) Bromine and Bromates — free (molecular) bromine shall not exceed 0.1 milligrams per liter in predominantly marine waters, and bromates shall not exceed 100 milligrams per liter in predominantly marine waters.

(9) Cadmium — shall not exceed 5.0 micrograms per liter in predominantly marine waters; shall not exceed 0.8 micrograms per liter in predominantly fresh waters in water with a hardness (in milligrams per liter of $CaCO_3$) of less than 150, and shall not exceed 1.2 micrograms per liter in harder waters.

(10) Chlorine (total residual) — shall not exceed 0.01 milligrams per liter.

(11) Copper — shall not exceed .015 milligrams per liter in predominantly marine waters; shall not exceed .03 milligrams per liter in predominantly fresh waters.

(12) Cyanide — shall not exceed 5.0 micrograms per liter.

(13) Dissolved Gases — shall not exceed 110% of the saturation value for gases at the existing atmospheric and hydrostatic pressures.

(14) Dissolved Oxygen — in predominantly fresh waters, the concentration shall not be less than 5 milligrams per liter. In predominantly marine waters, the concentration shall not average less than 5 milligrams per liter in a 24-hour period and shall never be less than 4 milligrams per liter. Normal daily and seasonal fluctuations above these levels shall be maintained in both predominantly fresh waters and predominantly marine waters.

(15) Fluorides — shall not exceed 5.0 milligrams per liter in predominantly marine waters.

(16) Iron — shall not exceed 1.0 milligrams per liter in predominantly fresh waters; 0.3 milligrams per liter in predominantly marine waters.

(17) Lead — shall not exceed .03 milligrams per liter in predominantly fresh waters.

(18) Mercury — shall not exceed 0.1 micrograms per liter in predominantly marine waters; shall not exceed 0.2 micrograms per liter in predominantly fresh waters.

(19) Nickel — shall not exceed 0.1 milligrams per liter.

(20) Nutrients — In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna.

(21) Pesticides and Herbicides:

(a) Aldrin plus Dieldrin — shall not exceed 0.003 micrograms per liter.

(b) Chlordane — shall not exceed 0.01 micrograms per liter in predominantly fresh waters and shall not exceed 0.004 micrograms per liter in predominantly marine waters.

(c) DDT — shall not exceed 0.001 micrograms per liter.

(d) Demeton — shall not exceed 0.1 micrograms per liter.

(e) Endosulfan — shall not exceed 0.003 micrograms per liter in predominantly fresh waters and shall not exceed 0.001 micrograms per liter in predominantly marine waters.

(f) Endrin — shall not exceed 0.004 micrograms per liter.

(g) Guthion — shall not exceed 0.01 micrograms per liter.

(h) Heptachlor — shall not exceed 0.001 micrograms per liter.

(i) Lindane — shall not exceed 0.01 micrograms per liter in predominantly fresh waters and shall not exceed 0.004 micrograms per liter in predominantly marine waters.

(j) Malathion — shall not exceed 0.1 micrograms per liter.

(k) Methoxychlor — shall not exceed 0.03 micrograms per liter.

(l) Mirex — shall not exceed 0.001 micrograms per liter.

(m) Parathion — shall not exceed 0.04 micrograms per liter.

(n) Toxaphene — shall not exceed 0.005 micrograms per liter.

(22) pH — pH of receiving waters shall not be caused to vary more than one (1.0) unit above or below normal pH of predominantly fresh waters as defined in Section 17-3.021, F.A.C., and coastal waters as defined in Section 17-3.05(1)(c), F.A.C.; and not more than two tenths (0.2) units above or below normal pH of open waters as defined in Section 17-3.05(1)(c), F.A.C.; the lower value shall not be less than six (6.0) in predominantly fresh waters or less than six and one-half (6.5) in predominantly marine waters and the upper value not more than eight and one-half (8.5).

(23) Phosphorus (elemental) — shall not exceed 0.1 micrograms per liter in predominantly marine waters.

(24) Phthalate Esters — shall not exceed 3.0 micrograms per liter in predominantly fresh waters.

(25) Polychlorinated Biphenyls — shall not exceed 0.001 micrograms per liter.

(26) Selenium — shall not exceed 0.025 milligrams per liter.

(27) Silver — shall not exceed 0.07 micrograms per liter in predominantly fresh waters and 0.05 micrograms per liter in predominantly marine waters.

(28) Transparency — the depth of the compensation point for photosynthetic activity shall not be reduced by more than 10% compared to the natural background value.

(29) Zinc — shall not exceed .03 milligrams per liter in predominantly fresh waters.

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708 FS. History—Formerly 28-5.09, 17-3.09, Amended 6-10-72, 6-30-72, 7-3-73, Amended and Renumbered 3-1-79.

17-3.13 Drainage Wells, Permits.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.182 FS. History—Formerly 28-5.13, Repealed 3-1-79.

17-3.131 Criteria: Class IV Waters — Agricultural Supplies Surface Waters. The criteria listed below are for surface waters classified as Class IV. The standards established in Sections 17-3.051 and 17-3.061, F.A.C., also apply to all waters of this classification, unless additional or more stringent criteria are specified below. The following criteria are to be applied except within zones of mixing.

(1) Alkalinity — shall not exceed 600 milligrams per liter as $CaCO_3$.

(2) Beryllium — shall not exceed 0.1 milligrams per liter in waters with a hardness in milligrams per liter of $CaCO_3$ of less than 250 and shall not exceed 0.5 milligrams per liter in harder waters.

(3) Boron — shall not exceed 0.75 milligrams per liter.

(4) Color, odor, and taste producing substances and other deleterious substances, including other chemical compounds, attributable to domestic wastes, industrial wastes, and other wastes — only such amounts as will not render the waters unsuitable for agricultural irrigation, livestock watering, industrial cooling, industrial process water supply purposes or fish survival.

(5) Cyanide — shall not exceed 5.0 micrograms per liter.

(6) Dissolved Oxygen — shall not average less than 4.0 milligrams per liter in a 24-hour period and shall never be less than 3.0 milligrams per liter.

(7) Iron — shall not exceed 1.0 milligrams per liter.

(8) Mercury — shall not exceed 0.2 micrograms per liter.

(9) Nickel — shall not exceed 0.1 milligrams per liter.

(10) pH — not more than one (1.0) unit from the normal or not less than six (6.0) nor greater than eight and one-half (8.5).

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708 FS. History—Formerly 28-5.10, 17-3.10, Amended 6-10-72, 630-72, Amended and Renumbered 3-1-79.

17-3.14 Drainage Wells, Applications.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.101, 403.182 FS. History—Formerly 28-5.14, Repealed 3-1-79.

17-3.141 Criteria: Class V-A Waters — Navigation, Utility and Industrial Use — Surface Waters. The criteria listed below are for surface waters classified as Class V-A. The standards contained in Sections 17-3.051 and 17-3.061, F.A.C., also apply to all waters of this classification, unless additional, alternative or more stringent criteria are specified below. The following criteria are to be applied except within zones of mixing:

(1) Cyanide — shall not exceed 5.0 micrograms per liter.

(2) Dissolved Oxygen — shall not be less than 2.0 milligrams per liter.

(3) Mercury — shall not exceed 0.2 micrograms per liter.

(4) Odor producing substances — only in such amounts as will not unreasonably interfere with the use of the water for the designated purpose of this classification.

(5) pH — not lower than 5.0 nor greater than 9.5 except certain swamp waters which may be as low as 4.5.

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708 FS. History—Formerly 28-5.11, 17-3.11, Amended and Renumbered 3-1-79.

17-3.15 Effective Date of Permits.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.182 FS. History—Formerly 28-5.15, Repealed 3-1-79.

17-3.151 Criteria: Class V-B Waters — Freshwater Storage and Utility and Industrial Supply — Groundwaters. As stated in Section 17-3.161, Florida Administrative Code, all groundwaters with total dissolved solids equal to or greater than 10,000 milligrams per liter are classified as Class V-B. Except within zones of discharge:

(1) The standards contained in Sections 17-3.051(1) and 17-3.071, F.A.C., apply to all waters of this classification: and

(2) The standards contained in Sections 17-3.101, F.A.C., apply to waters of this classification which are used for or can reasonably be expected to be used for a potable supply.

Specific Authority 403.061, 403.062, 403.087, 403.504, 403.704, 403.804 FS. Law Implemented 403.021, 403.061, 433.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708, FS. History—New 3-1-79.

17-3.16 Drainage Wells, Drilling Requirements.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.182 FS. History—Formerly 28.516, Repealed 3-1-79.

17-3.161 Classified Waters.

(1) The surface waters of the State of Florida are classified by river basins or sub-basins as Class III — Recreation Propagation and Management of Fish and Wildlife, with only the individual exceptions to Class III listed within each basin as delineated on USGS Map, "Drainage Basins in Florida", Map Series No. 28, October 1967. Outstanding Florida Waters are listed in Section 17-3.041, Florida Administrative Code. All secondary and tertiary canals wholly within agricultural areas are hereby classified as Class IV, and are not listed below. Agricultural areas shall generally include lands actively used solely for the production of food and fiber which are zoned for agricultural use where county zoning is in effect. Agricultural areas exclude lands which are platted and subdivided or in a transition phase to residential use.

(2) The groundwaters of the State of Florida are classified on the basis of total dissolved solids content. Groundwaters with levels of total dissolved solids less than 10,000 milligrams per liter are classified as Class I-B, and groundwaters with naturally-occurring levels of total dissolved solids equal to or greater than 10,000 milligrams per liter are classified as Class V-B. These waters are not listed below.

(3) Florida Water Classifications.

(a) Nassau — St. Marys Basin (No. 19). This basin consists of U.S. Geological Survey Basins 09J (St. Marys River Basin and coastal area) and 09D (Coastal area between St. Marys River and St. Johns River), and lie wholly or partially in the following counties: Nassau, Baker, Columbia, Union and Duval (Consolidated City of Jacksonville). The following individual waters are exceptions to Class III:

1. Nassau County. South Amelia River — Nassau River north to Harrison Creek — Class II. Alligator Creek — Class II.

2. Nassau County and Duval County. Nassau River and Creek — Nassau Sound to Seymore Point — Class II.

3. Duval County (Consolidated City of Jacksonville). Pumpkinhill Creek — Class II. Intracoastal Waterway and tributaries — confluence of Nassau and Amelia Rivers south to Flashing Marker "72", thence eastward along Ft. George River to Ft. George Inlet and includes Garden Creek and both prongs of Simpson Creek

— Class II.

(b) St. Johns Basin (No. 20). This basin consists of U.S. Geological Survey Basins 09E (St. Johns River basin and Sub-basins) 09E1 (St. Johns River above Oklawaha River, 09E2 — Oklawaha River, and 09E3 — St. Johns River below Oklawaha River), and lies wholly or partially in the following counties: Duval (Consolidated City of Jacksonville), St. Johns, Clay, Bradford, Alachua, Putnam, Flagler, Volusia, Marion, Levy, Lake, Sumter, Seminole, Orange, Brevard, Osceola, Polk, Indian River, Okeechobee and St. Lucie. The following individual waters are exceptions to Class III:

1. Brevard County and Indian River County. St. Johns River and Tributaries — Lake Washington Dam south through and including Sawgrass Lake, Lake Hellen Blazes, and Blue Cypress Lake to SR 60 in Indian River County — Class I-A.

2. Duval County. Ft. George River — Ft. George Inlet north to Nassau — St. Marys/St. Johns Basin Boundary — Class II.

(c) Suwannee Basin (No. 21). This basin consists of U.S. Geological Survey Basin 09J (Suwannee River Basin) and Sub-basins, 09J1 (Suwannee River above Withlacoochee River), 09J2 (Alapaha River), 09J3 (Withlacooche River), 09J5 (Suwannee River below Withlacoochee River), and 09J6 (Santa Fe River) and lies wholly or partially in the following counties: Madison, Hamilton, Columbia, Baker, Union, Bradford, Clay, Alachua, Gilchrist, Suwannee, Lafayette, Dixie, Taylor, and Levy. The following individual waters are exceptions to Class III:

1. Dixie County. Tidal Creeks within USGS Sub-basin 09J5 north of, but excluding the mouth of, the Suwannee River from Suwannee River or Gulf of Mexico to source — Class II.

2. Levy County. Tidal Creeks within USGS Sub-basin 09J5 south of, but excluding the mouth of, the Suwannee River from Suwannee River or Gulf of Mexico to source — Class II.

3. Hamilton County. Jumping Gully Creek — Unclassified.

(d) Aucilla — Ochlockonee — St. Marks Basin (No. 22). This basin consists of U.S. Geological Survey Basins 09K (Aucilla River Basin), 11B (Coastal area between Aucilla River and Ochlockonee River), 11C (Ochlockonee River basin and coastal areas), and 11D (Coastal area between Ochlockonee River and Apalachicola River) and lies wholly or partially in the following counties: Gadsden, Leon, Jefferson, Madison, Liberty, Franklin, Wakulla, Taylor, Lafayette, and Dixie. The following individual waters are exceptions to Class III:

1. Gadsden County. Quincy Creek — SR. 65 to source — Class I-A. Holman Branch — SR 270-A to sourc — Class I-A.

2. Franklin County. Ochlockonee Bay — Confluence of Sopchoppy and Ochlockonee Rivers to Gulf of Mexico — Class II. Alligator Harbor — East from a line from Peninsula Point north to St. James Island to mean high water — Class II. Gulf of Mexico — North of a line from Peninsula Point on Alligator Point to the northeastern tip of Dog Island and bounded on the east by Alligator Harbor and west by St. George Sound — Class II. St. George Sound (Portion in USGS Basin 11D) — Gulf of Mexico westerly to Apalachicola Bay — Class II. East Bay and Tributaries (Portion in USGS Basin 11D) — Apalachicola Bay to source — Class II.

3. Wakulla County. Oyster Bay, Apalachee Bay, and Tributaries — West of a line from western tip of Shell Point south to FL. 4 sec. marker and southerly to Ochlockonee Point, with the exception of Spring Creek and portion of King Bay west and north of a line from westernmost tip of Porter Island south to Hungry Point — Class II.

4. Jefferson County and Wakulla County. Coastal waters — Mouth of Aucilla River west to Live Oak Point excluding mouths of drainage areas — Class II.

5. Taylor County. Fenholloway River — Class V-A.

6. Dixie County. Tidal Creeks and coastal waters — Horseshoe Point south to basin boundary of USGS Basin 09K — Class II.

(e) Withlacoochee Basin (No. 23). This basin consists of U.S. Geological Survey Basin 09H (Coastal area between the Withlacoochee River Basin and Suwannee River) and lies wholly or partially in the following counties: Gilchrist, Levy, Alachua, Marion, Citrus, Sumter, Hernando, Pasco, Lake and Polk. The following individual waters are exceptions to Class III:

1. Levy County. Tidal Creeks and coastal waters — South from USGS Basin boundary line 09H separating the Suwannee Basin from the Withlacooohee Basin to the Withlacoochee River excluding the Cedar Key area and the mouth of the Withlacoochee River — Class II.

(f) Tampa Bay Area Basin (No. 24). This basin consists of U.S. Geological Survey Basins 10J (Coastal area between Withlacoochee River and Hillsborough River), 10H (Hillsborough River Basin and coastal are a north of Alafia River), 10G (Alafia River Basin) and 10F (Coastal area between Alafia River and Myakka River), and lies wholly or partially in the following counties: Citrus, Hernando, Pasco, Pinellas, Hillsborough, Polk, Manatee, Sarasota, Charlotte, and Lee. The following individual waters are exceptions to Class III:

1. Citrus County. Tidal Creeks and coastal waters — Latitude 28° 54′ N., south to Hernando County line with the exception of waters which are bounded by and including the Crystal River on the north, St. Martins River on the south, barrier islands on the west, and the mainland on the east — Class II.

(2) Pinellas County. Mullet Key Area — Class II. Tampa Bay — South Pinellas County Line to Gandy Causeway — Class II. Old Tampa Bay — Gandy Causeway to Safety Harbor — Class II. Safety Harbor to Old Tampa Bay — Class II. Mobbly Bay — Portion in Pinellas County — Class II.

3. Hillsborough County. Old Tampa Bay and Mobbly Bay — Beginning at the intersection of the north shore of SR 60 (Courtney Campbell Parkway) and Longitude 82° 35′ 45′ west, thence due north to the line of mean high water, thence westward along the line of mean high water, including Rocky and Double Branch Creeks to SR 580 and up the upper Tampa Bay watershed canal to a line connecting the lines of mean high water on the outer sides of the canal banks, to the county line, thence southerly along the county line to SR 60, thence along the north shore of SR 60 to the point of beginning — Class II. Old Tampa Bay — All waters within Hillsborough County bounded on the north by SR 60 (Courtney Campbell Parkway), then south by Interstate 4 (Howard Franklin Bridges), the west by the county line, and the east by the line of mean high water — Class II. Tampa Bay — Beginning at Gadsden Point, thence along a line connecting Gadsden Point and the intersection of Gadsden Point Cut and Cut "A" to a point one-half nautical mile inside said intersection, thence westward along a line one-half nautical mile inside and parallel to Gadsden Point Cut, Cut "G", Cut "J", Cut "J2", and Cut "K", to the line of mean high water, thence along the line of mean high water to the point of beginning — Class II. Tampa Bay — Beginning at the intersection of the Hillsborough County Line and the line of mean high

water, thence to the rear range marker of Cut "D", thence northerly along the line of Cut "D" range to a point one-half nautical mile inside the southern boundary of Cut "C", thence along a line one-half mile inside and parallel to Cut "C", Cut "D", and Cut "E" to a point with Latitude 27° 45′40″ N. and Longitude 82°30′40″ west, thence to a point Latitude 27°47′ north and Lougitude 82°27′ west, thence on a true bearing of 140° to the line of mean high water, thence along the line of mean high water to the western tip of Mangrove Point, thence to the northwestern tip of Tropical Island, thence eastward along the line of mean high water to the eastern tip of Goat Island, thence due south to the line of mean high water, thence along the line of mean high water to the point of beginning — Class II. Tampa Bay — Hillsborough County portion west of the Sunshine Skyway and from the three fathom depth contour up to the line of mean high water — Class II. Hillsborough River — City of Tampa Water Treatment Plant Dam to Flint Creek — Class I-A. Cow House Creek — Hillsborough River to source — Class I-A.

4. Manatee County. Terra Ceia Bay — To Terra Ceia Point — Class II. Palma Sola Bay — Class II. Passage Key Area — Egmont Key to Anna Maria Island — Class II. Sarasota Bay — East-west line through marker "48" on Intracoastal Waterway south to Manatee County Line — Class II. Manatee River — Rye Bridge Road to Bethany Vicinity — Class I-A. Ward Lake — SR 70 to source (SR 675) — Class I-A.

5. Sarasota County. Sarasota Bay — West of Center (Intracoastal Waterway) — Class II. Lemon Bay — Forked Creek south to Charlotte County Line — Class II.

6. Charlotte County. Lemon Bay and Tributaries — N. Charlotte County Line south to Placida Harbor and bounded on the east by SR 775 — Class II. Placida Harbor — to mean high water — Class II. Gasparilla Sound — Placida Harbor to Charlotte County Line — Class II. Bull Bay — mean high water to Charlotte County Line — Class II. Turtle Bay — mean high water to Charlotte County Line — Class II. Charlotte Harbor — Portion in USGS Basin 10F south to Charlotte County Line — Class II.

7. Lee County. Charlotte Harbor — Portion in USGS Basin 10F south from N. Lee County Line — Class II.

(g) Peace Basin (No. 25). This basin consists of U.S. Geological Survey Basins 10E (Myakka River Basin), 10D (Peace River Basin) and 10C (Coastal area between Peace River and Caloosahatchee River) and lies wholly or partially in the following counties: Polk, Hillsborough, Manatee, Hardee, Highlands, Sarasota, DeSoto, Charlotte, Glades, and Lee. The following individual waters are exceptions to Class III:

1. Sarasota County. Big Slough Canal — South to U.S. 41 — Class I-A. Myakka River — Myakka vicinity through Upper and Lower Myakka Lakes to Manhattan Farms — Class I-A. Myakka River — S.W. North Port Charlotte Limit south to Charlotte County Line — Class II.

2. DeSoto County. Horse Creek — Vicinity Jct. SR 760 and SR 761 to Peace River — Class I-A.

3. DeSoto County and Charlotte County. Prairie Creek — Headwaters to Shell Creek — Class I-A.

4. Charlotte County. Myakka River — N. Charlotte County Line south to Charlotte Harbor — Class II. Charlotte Harbor — Portion in Peace Basin south to Charlotte County Line — Class II. Alligator Creek — North and south prongs from headwaters to SR 765-A — Class I-A. Shell Creek Headwaters to Ridge Harbor — Class I-A. Lemon Bay and tributaries — Placida Harbor north to Tampa Bay Area/Peace Basin Boundary, and bounded on the east by SR 775 — Class II. Port Charlotte Canal System — Surface waters lying upstream of, or directly connected to, Fordham Waterway upstream of Conway Boulevard — Class I-A.

5. Lee County, Charlotte Harbor — Portion in USGS Basin 10C north to N. Lee County Line — Class II. Pine Island Sound — Charlotte Harbor to San Carlos Bay — Class II. Matlacha Pass — Charlotte Harbor to San Carlos Bay — Class II. San Carlos Bay — Portion in USGS Basin 10C — Class II.

(h) Kissimmee Basin (No. 26). This Basin consists of U.S. Geological Survey Sub-basin 10B1 — Lake Okeechobee inflow area and lies wholly or partially in the following counties: Lake, Orange, Polk, Osceola, Highlands, Okeechobee, Glades, Charlotte, Saint Lucie, and Martin. There are no individual exceptions to Class III in this basin.

(i) Florida East Coastal Basin (No. 27). This basin consists of U.S. Geological Survey Basins 09F (Coastal area between St. Johns River and Turkey Creek) and 10A (Turkey Creek and coastal area south to St. Lucie River) and lies wholly or partially in the following counties: Duval (Consolidated City of Jacksonville), St. Johns, Flagler, Volusia, Brevard, Indian River, St. Lucie, and Martin. The following individual waters are exceptions to Class III:

1. St. Johns County. Tolomato River (North River) and Tributaries — From a line connecting Spanish Landing to Booth Landing south to Intracoastal Waterway marker number 55 — Class II. Guano River and Tributaries — From Guano Lake Dam south to Tolomato River—Class II. Salt Run—All waters south of an east-west line connecting Lighthouse Park boat ramp with Conch Island — Class II. Matanzas River, Intracoastal Waterway and tributaries, excluding Treasure Beach Canal System — From Intracoastal Waterway marker number 29 south to Flagler County Line — Class II.

2. St. Johns County and Flagler County. Pellicer Creek — Class II.

3. Flagler County. Matanzas River (Intracoastal Waterway) — N. Flagler County Line south to Fl. Marker "109" — Class II.

4. Volusia County. Indian River North — Channel Marker 57 south to Mosquito Lagoon — Class II. Mosquito Lagoon — Indian River North south to S. Volusia County Line — Class II.

5. Brevard County. Mosquito Lagoon — North Brevard County Line south to Max Hoeck Creek — Class II. Indian River — N. Brevard County Line south to Florida East Coast Railroad Crossing (vicinity Jay Jay) — Class II. Indian River — Barnes Blvd. south to South Section Line of Section 29, T. 26 S., R. 37 E., Palm Shores — Class II. Indian River — Cape Malabar south to S. Brevard County Line — Class II. Trout Creek — Class II. Kid Creek — Class II. Goat Creek — Class II.

6. Indian River County. Indian River — Sebastian Inlet (N. Indian River County Line) south to Wabasso vicinity east of channel centerline — Class II. Indian River — Wabasso vicinity south to vicinity North Relief Canal — Class II.

7. St. Lucie County. Indian River — N. St. Lucie County Line south to Garfield Point — Class II. Indian River — Middle Cove vicinity south to S. St. Lucie County Line, east of Channel centerline — Class II.

8. Martin County. Indian River — N. Martin County Line south to St. Lucie Inlet, east of Channel centerline — Class II.

(j) Lower Florida Basin (No. 28). This basin consists of U.S. Geological Survey Sub-basin 10B2 — Lake

Okeechobee and the Everglades and lies wholly or partially in the following counties: Charlotte, Glades, Lee, Hendry, Collier, Monroe, Dade, Broward, Palm Beach, Martin, St. Lucie, and Okeechobee. The following individual waters are exceptions to Class III:

1. Lee County. Caloosahatchee River — E. Lee County Line to South Florida Water Management District Structure 79 — Class I-A. San Carlos Bay — Portion in USGS Sub-basin 10B2 — Class II. Matanzas Pass — San Carlos Bay to Estero Bay — Class II. Hell Peckish Bay — Class II.

2. Collier County. Cocohatchee River — Class II. Little Hickory Bay — Class II. Wiggins Pass — Class II. Inner and Outer Clam Bay — Class II. Inner and Outer Doctors Bay — Class II. Connecting Waterways — Wiggins Pass south to Outer Doctors Bay — Class II. Naples Bay — Class II. Dollar Bay — Class II. Tidal Bays and Passes — Rookery Bay south and easterly through Ten Thousand Islands to Monroe County Line — Class II.

3. Monroe County. Monroe County Coastline — North Monroe County Line south and including Florida Bay within Everglades National Park — Class II.

4. Dade County. Miami River — Salinity barrier easterly 5.7 miles to Biscayne Bay — Class IV.

5. Broward County. Abandoned Rock Pit — Northeast corner of SR 7 and Prospect Field Road in the S.W. Quarter of Section 7, T. 49 S., R. 42 E. — Class I-A.

6. Palm Beach County. M- Canal L-8 to Lake Mangonia — Class I-A. Lake Mangonia — Class I-A. Clear Lake — Class I-A. Canal C-18 (freshwater portion) — Class I-A. Canal C-18 — Salinity barrier to Loxahatchee River — Class II.

7. Palm Beach County and Martin County. Loxahatchee River — Above Florida East Coast Railroad Bridge including South, Northwest, and North Forks — Class II.

8. Martin County. Great Pocket — St. Lucie River to Peck's Lake — Class II.

9. Multi County. Lake Okeechobee — Class I-A.

(k) Apalachicola Basin (No. 31). This basin consists of U.S. Geological Survey Basins 11E (Apalachicola River Basin) and Sub-basins 11E2 (Chattahoochee River below Mulberry Creek), 11E7 (Apalachicola River) and 11E8 (Chipola River), and lies wholly or partially in the following counties: Jackson, Gadsden, Washington, Bay, Calhoun, Liberty, Gulf, and Franklin. The following individual waters are exceptions to — Class III:

1. Gadsden County. Mosquito Creek — U.S. Highway 90 north to Florida State Line — Class I-A.

2. Franklin County. East Bay — Portion in USGS Sub-basin 11E7 with exception of area encompassed within 2-mile radius from Apalachicola entrance of John Gorrie Memorial Bridge — Class II. Apalachicola Bay — Portion in USGS Sub-basin 11E7 with exception of area encompassed within 2-mile radius of John Gorrie Memorial Bridge — Class II.

(l) Choctawhatchee Basin (No. 32). This basin consists of U.S. Geological Survey Basins 11F — Coastal Area between Apalachicola River and Choctawhatchee River, 12A — Choctawhatchee River Basin, 12B — Coastal area between Choctawhatchee River and Yellow River and Sub-basins 12A3 — Pea River and 12A4 — Choctawhatchee River below Pea River, and lies wholly or partially in the following counties: Jackson, Calhoun, Gulf, Franklin, Holmes, Washington, Bay, Walton, Okaloosa, Santa Rosa, and Escambia. The following individual waters are exceptions to — Class III.

1. Jackson County. Washington County, and Bay County. Econfina Creek — Deer Point Impoundment to source — Class I-A.

2. Gulf County. Indian Lagoon — West of Indian Pass and St. Vincent Sound — Class II. St. Joseph Bay — South and west of a line from St. Joseph Point to vicinity Port St. Joe — Class II.

3. Franklin County. St. George Sound (Portion of USGS Basin 11F) — East Pass to Apalachicola Bay — Class II. Apalachicola Bay — Portion in USGS Basin 11F with exception of area encompassed within 2-mile radius from Apalachicola entrance of John Gorrie Memorial Bridge — Class II. St. Vincent Sound — Apalachicola Bay to Indian Pass — Class II.

4. Bay County. East Bay and Tributaries — East of U.S. Highway 98 to, but excluding, Wetappo Creek — Class II. North Bay and Tributaries — North of U.S. Highway 98 to Deer Point Dam excluding Alligator and Fanning Bayous — Class II. West Bay and Tributaries — West of North Bay (line from West Bay Point on the north to Shell Point on the south) except West Bay Creek (northwest of Channel Marker 27C off Goose Point), Crooked Creek (north of a line from Crooked Creek point to Doyle Point), and Burnt Mill Creek (north of a line from Graze Point to Cedar Point) — Class II. Deer Point Impoundment — Dam to source — Class I-A. Bayou George and Creek — Impoundment to source — Class I-A. Bear Creek Impoundment to source — Class I-A. Big Cedar Creek — Impoundment to source — Class I-A.

5. Walton County and Okaloosa County. Choctawhatchee Bay and Tributaries — Eastward from a line from White Point southwesterly through Fl. Light Marker "2" of the Intracoastal Waterway, and south of a line from Alaqua Point to Wheeler Point, to the eastern sources — Class II.

6. Okaloosa County. Rocky Bayou — Choctawhatchee Bay to Rocky Creek — Class II. Santa Rosa Sound — Okaloosa/Santa Rosa County Line east to Manatee Point — Class II.

7. Okaloosa County, Santa Rosa County, and Escambia County. Santa Rosa Sound — From a line connecting Gulf Breeze approach to Pensacola Beach, Bascule Bridge, and Sharp Point east to north — south line through Manatee Point with exception of the Navarre Beach area from Channel Marker "109" to Navarre Bridge — Class II.

8. Santa Rosa County. Blackwater Bay (Portion in USGS Basin 12B) — From a line connecting Robinson's Point to Broad River south to East Bay (line due west from Escriban Point) — Class II. East Bay and Tributaries (Portion in USGS Basin 12B) — Blackwater Bay (line due west from Escribano Point) southerly to Pensacola Bay (line from Garcon Point on the North to Redfish Point on the South) — Class II.

(m) Perdido-Escambia Basin (No. 33). This basin consists of U.S. Geological Survey Basins 12C (Yellow River Basin), 12D (Blackwater River Basin and coastal area), 12E (Escambia River Basin and coastal area), and Sub-basins 12E1 (Conecuh River) and 12E4 (Escambia River) and lies wholly or partially in the following counties: Walton, Okaloosa, Santa Rosa, and Escambia. The following individual waters are exceptions to — Class III:

1. Santa Rosa County. Blackwater Bay (Portion in USGS Basins 12C and 12D) — From a line connecting Robinson's Point to Broad River south to East Bay (line due west from Escribano Point) — Class II. East Bay (portion in USGS Basin 12D) — Blackwater Bay (line due west from Escribano Point) — southerly to Pensacola Bay (line from Garcon Point on the north to Redfish Point on the South) — Class II.

2. Santa Rosa County and Escambia County. Escambia Bay — Louisville and Nashville Railroad

Trestle south to Pensacola Bay (Line from Emanuel Point east northeasterly to Garcon Point) — Class II. Pensacola Bay — East of a line connecting Emanuel Point on the north to the south end of the Pensacola Bay Bridge (U.S. Highway 98) — Class II. Santa Rosa Sound — From a line connecting Gulf Breeze approach to Pensacola Beach, Bascule Bridge, and Sharp Point east to Santa Rosa/Okaloosa County line with exception of the Navarre Beach area from Channel Marker "109" to Navarre Beach — Class II.

Specific Authority 403.061, 403.062, 403.087, 403.804, 403.704, 403.804 FS. Law Implemented 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708 FS. History—New 3-21-68, Formerly 28-5.21, Amended 3-4-71, 7-13-78, 3-5-80.

17-3.17 Drainage Well Permit Revocation and Modification.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.182 FS. History—Formerly 28-5.17, Repealed 3-1-79.

17-3.18 Test Wells and Borings.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.101, 403.182 FS. History—Formerly 28-5.18, Repealed 3-1-79.

17-3.19 Abandoned Wells.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.061 FS. History—Formerly 28-5.19, Repealed 3-1-79.

17-3.20 Pollution surveys.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.061, 403.101, 403.182 FS. History—Formerly 28-5.20, Amended and Renumbered as 17-4.247, 3-1-79.

17-3.21 Classified Waters.

Specific Authority 403.061 FS. Law Implemented 403.021, 403.061 FS. History—Formerly 28-5.21, Amended 6-10-72, 10-24-74, Amended and Renumbered as 17-3.161, 3-1-79.

17-3.22 Application Forms.

Specific Authority 403.061(7) FS. Law Implemented 120.53(1), 403.061(15), 403.061(16) FS. History—New 4-25-77, Transferred to 17-1.122(1), 2-18-79.

RESPONSE HEC-2

The amount of sulfur dioxide emissions used in the ambient air quality analysis is during worst case conditions and is considered to be very conservative. Three methods will be utilized to regulate emissions: coal washing with up to 25 percent reduction, lime/limestone scrubbing with up to 86 percent reduction, and sulfur content of raw coal. It can be seen that, should the availability of low-sulfur coal dwindle, two other continuous reduction methods are available to maintain maximum permitted emissions. It should also be noted that this unit will be regulated under New Source Performance Standards, which call for continuous monitoring of sulfur dioxide as well as an overall 90 percent reduction of projected uncontrolled emissions.

RESPONSE HEC-3

The emissions data estimates in the DEIS have been misinterpreted by the commentor. The uncontrolled fugitive dust emission rate of 900 tn/yr (which actually should be 1200 tn/yr, see errata) is the emission rate which would occur if no controls were applied. However, controls will be applied, reducing the actual emission rate to about 120 tn/yr. Furthermore, this controlled emission rate is for all four units, not just Unit 4. Therefore, the projected total actual TSP emission rate from Unit 4 (with controls) equals 568 tn/yr (from the stack) plus approximately 1/4 of the 120 tn/yr from coal handling for a total of 598 tn/yr. Also, the projected actual emission rate from the stack of 568 tn/yr reflects a reduction of approximately 70 percent from the emission rates of each of the existing units due to the current stricter controls on TSP emissions from new facilities.

RESPONSE HEC-4

Analyses of precipitation over the last several decades have indicated that the acidity of the precipitation has increased, principally in the eastern United States and in western Europe. In the United States the problem of acid rain ($pH < 5.6$) has been particularly acute in the northeast. Research conducted in Florida has shown the acidity of precipitation falling in the State has also increased. Analyses have indicated that nearly all of the acidity of precipitation falling in Florida is attributable to sulfuric and nitric acids. Brezonik et al. (1980) reported the sulfuric acid component of the acidity to be 2.0 to 2.5 times that of the nitric acid component.

Because of the complexity of air transport mechanisms and the chemical processes involved in acid rain formation, it is not known how specific sources (e.g., Big Bend Unit 4) would affect the acidity of precipitation. It is thought that power plant emissions (principally SO_2) contribute to the acid rain phenomenon. This was identified in the EIS.

As noted, the reported effects of acid rain include acidification of lakes and rivers with the attendant impact to aquatic ecosystems, acidification of ground water, acidification and release of metals from soils, deterioration of structures such as buildings, metals, and statuary and possible damage to forests and agricultural crops.

The USEPA is extensively involved in research and monitoring efforts to study this globally significant problem. EPA has developed the coordinated Federal monitoring program which is to support the nation's acid rain research initiative. EPA in conjunction with the National Oceanic and Atmospheric Administration (NOAA) is supporting the U.S. contribution to the global monitoring network established by the World Meteorological Organization. EPA Environmental Research Laboratories and offices are currently directing or participating in numerous acid rain related studies. These studies include investigations into the effects of acid rain on vegetation, agricultural crops, aquatic systems, health, air transport mechanisms, atmospheric and precipitation chemistry and kinetics, aerosol formation and deposition, and related areas.

References

Air Pollution Control Association Presentation. 1980. Acid Rain: An International Concern. Journal of the Air Pollution Control Association, 30(10): 1089. October.

Brezonik, P. L., Hendry, C. D., Edgerton, E. S., Schultze, R. L., and Chrisman, T. L. 1980. Acidity, Nutrients, and Minerals in Atmospheric Precipitation over Florida: Deposition Patterns, Mechanisms, and Ecological Effects. Completion Report to U.S. EPA for contract #R-805560.

Likens, G. E., Wright, R., Galloway, J., and Butler, T. 1979. Acid Rain. Scientific American, Volume 24, November 4. October.

U.S. Environmental Protection Agency. Acid Rain. October, 1979. Office of Research and Development. EPA-600/8-79-028.

U.S. Environmental Protection Agency. Acid Rain. July, 1980. Office of Research and Development. EPA-600/9-79-036.

RESPONSE HEC-5

Results of studies on the distribution of benthic macrophytes in the Big Bend area, including the Apollo Beach northern embayment, have been presented in the DEIS (Section 3.3.1.4) and supporting TRD (Section 5.3.4.2). However, these studies have only limited value as a basis for assessment of power plant impacts. Sipe et al. (1979) and Mangrove Systems, Inc. (1980), by comparing historical maps and aerial photography, have documented a significant decrease (up to 80 percent) in the distribution of benthic seagrasses within Hillsborough County since 1876. Mangrove Systems, Inc. (1980) suggested the decline was due to a variety of causes including dredge and fill activities in conjunction with shoreline development, industrial discharges, and water quality degradation. In the quantitative distributional studies conducted at Big Bend, Mangrove Systems, Inc. (1978, 1979) noted that, while ". . . it is likely that the seagrass community in the embayment represents a stressed system . . . , the exact role of past dredging, solar heating, and thermal effluent on this stressed system is unclear." Mangrove Systems, Inc. (1979) noted that ". . . any comparisons (of the distribution of seagrasses in the embayment) with the control station (subtidal bottom located in an undeveloped area south of Apollo Beach) reflect the combined construction and operation activities of all dredged sites in the area, including Port Redwing; Big Bend Units 1, 2, & 3; and the Apollo Beach residential development."

While there is the potential for increased stress upon the seagrass/algal and mangrove communities within the embayment from the additional thermal load from Unit 4, there are no data to allow for differentiation from other sources of impact to these communities. Studies conducted at Big Bend (Mahadevan et al., 1977, 1980) have suggested that the extreme shallowness (mean depth ~1 meter) and solar heating may be the most important factors controlling water temperatures in the embayment. Water temperatures were often greater in the embayment than occurred at the site of the discharge of the plant thermal effluent. It may be possible to extend the sheet pile wall. However, it has not been demonstrated that there is a problem of thermal loading in the embayment area. See also responses to written comments CDC-3 and CDC-5.

RESPONSE HEC-6

Under present criteria of the Resource Conservation and Recovery Act (RCRA), utility ash and FGD scrubber wastes are not designated as "hazardous" and therefore do not require long-term closure plans. However, should these wastes be reclassified, TECO is committed to fulfill all pertinent regulations including those related to long-term maintenance of the disposal sites. As proposed, the fly ash and FGD by-product waste are to be marketed. For those wastes disposed onsite, a groundwater monitoring program to detect contamination is to be implemented.

RESPONSE HEC-7

See response to transcript comment GCR-13.

RESPONSE DOI-1

Deposits of phosphate, limestone and peat are actively mined in the Central Florida region. The only impact of the project on these resources will be the consumption of approximately 3.4 million tons of limestone by the FGD system during the life of the plant. This limestone will come from mining operations within the Central Florida region.

RESPONSE DOI-2

The recommendation of the Fish and Wildlife Service regarding the manatee has been considered. Tampa Electric Company will close the boat ramp from November 15 through March 30. Paragraph M of the NPDES permit Part III NEPA conditions has been rewritten to reflect closure of the boat ramp between these dates.

RESPONSE CR-1

Comment acknowledged.

RESPONSE CR-2

Comment noted. As explained in Section 2.6 of the DEIS, onsite disposal of fly ash and gypsum will be required only to the extent that these byproducts are not marketable. TECO is now selling the fly ash from Units 1-3 and intends to sell the gypsum as well.

RESPONSE CR-3

Comment acknowledged.

RESPONSE CR-4

Comment acknowledged.

RESPONSE CR-5

Comment acknowledged.

RESPONSE SC-1

EPA on numerous occasions has expressed reservations with the Section 316 modeling efforts pursued by TECO for the Big Bend complex. Appendices C and D of the Draft EIS contained EPA's tentative findings and determination relative to the Section 316 (a) & (b) issues associated with Big Bend Units 1-3 and Unit 4.

In that the methodology of the modeling efforts was not accepted by EPA nor used in the Agency's findings, the comments raised are noted but do not require a response.

RESPONSE SC-2

See response to written comment SC-1.

RESPONSE SC-3

Comments noted. The Draft EIS should be read for a discussion of the water quality aspects of Unit 4.

RESPONSE SC-4

See response to written comment SC-1.

RESPONSE SC-5

This comment is addressed to the Florida Public Service Commission. EPA does not have the expertise or jurisdiction to make decisions relative to the need for power. See EPA's response to written comment SC-7 relating to conservation.

RESPONSE SC-6

See response to written comment SC-7.

RESPONSE SC-7

The Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) (40 CFR 1500-1508) outline the provisions by which Federal agencies are to comply with NEPA. The CEQ regulations do identify alternatives evaluation as the heart of the EIS (40 CFR 1502.14). The principal alternatives identified during the scoping process were cooling water systems and air emissions control.

Additionally, in the Draft EIS, siting, wastewater treatment, solid waste disposal, and electric generating (technologies and management) alternatives were addressed. Conservation alternatives to Big Bend Unit 4 were not raised during the scoping process. Consequently, this was not identified as a significant issue in the Draft EIS.

The language of 40 CFR 1502.16 is that the environmental consequences of various alternatives shall include discussions of "(e) energy requirements and conservation potential of various alternatives and mitigation measures." All reasonable alternatives were presented and addressed in the Draft EIS in accordance with the CEQ regulations (40 CFR 1502.14a).

The CEQ regulations allow for the incorporation by reference in the EIS of reasonably available information (40 CFR 1502.23). Additionally, Federal agencies may cooperate with State and local agencies to eliminate duplication of effort in environmental assessments. The Florida Public Service Commission had previously analyzed the need-for-power question and had issued an Order permitting construction of the new facility. These analyses and decisions are primarily the responsibility of the Florida Public Service Commission (FPSC). EPA's primary responsibility is to address the environmental impacts of project alternatives. In fulfilling this responsibility EPA may use the resources of other agencies.

In late 1980 the FPSC adopted rules 25-17.01 through 25-17.05, Florida Administrative Code, which established statewide energy conservation goals as required by the Florida Energy Efficiency and Conservation Act (FEECA). The primary focus of these goals was directed toward the conservation potential in the residential sector. FEECA directly addressed energy efforts toward increasing the efficiency of Florida's electric generating system by reducing weather sensitive peak demand and kilowatt hour consumption.

Attainment of the conservation goals would reduce the projected energy growth in the peninsula from 4.3 percent to 2.6 percent for the period 1980 to 1989. With respect to current expansion plans, the reserve margin for firm load for the 1988/1989 winter peak would be 65.5 percent if the goals are achieved. Elimination of proposed expansions would reduce the reserve margin to 33.7 percent in 1988/1989. A reserve margin of 20-30 percent for individual utilities is considered adequate and reasonable. In addition, attainment of these goals would reduce projected 1990 oil consumption for electrical generation by 25 percent.

Based on this analysis, the FPSC stated in their Order (9749) that the achievement of the conservation goals would eliminate the peninsula's need for Big Bend Unit 4. However, the FPSC further stated that if the goals were not achieved, additional generating capacity may be needed.

The FPSC also looked specifically at the projected electrical power needs in the TECO service area. If the conservation goals are met in the TECO service area and if Big Bend Unit 4 is not certified or is significantly delayed, TECO reserve margins would drop to 21.3 percent for the winter of 1985/1986 and to 11.7 percent for the winter of 1988/1989. Consequently, the FPSC stated in their Order the need for additional capacity is apparent in the TECO service area.

As noted, an element of the FEECA goals is to reduce the peninsula's dependence on foreign oil. The FPSC stated in their Order that based on their worst case analysis (construction cost overruns and delays) significant economic benefits would result from construction of Big Bend Unit 4. Approximately 3.9 million barrels of oil would be displaced annually and could contribute approximately $232 million (1980 dollars) to reducing Florida's dependence on imported oil.

An alternative to meeting the need for additional generating capacity is purchase of power. The FPSC stated in their Order that such efforts have been determined not to be cost or time effective on the basis of the economics considered.

Based upon the testimony and evidence entered in the hearing record, the FPSC stated in their Order that Big Bend Unit 4 is needed and should be approved. No evidence was presented in the hearing record regarding the inadequacy of the conservation analysis. No evidence was presented on this issue during the States administrative hearing for determining whether the power plant siting application for Unit 4 should be granted.

EPA, in preparing the Draft EIS considered the analysis of the FPSC. Based upon this analysis and EPA's review, consideration of conservation efforts was an element of the FPSC decision. Consequently, a specific independent reassessment of the conservation alternative was not undertaken particularly since this issue was not identified during scoping.

Conservation measures including installation of energy efficient appliances and energy auditing and loan programs sponsored by the utility for such measures as solar hot water heaters, heat pumps, or weatherization have been effectively used in other areas. While it may be possible to project the degree of conservation possible if all consumers utilize the most energy-efficient home features and appliances, a study of this magnitude is outside the scope of this EIS. The conservation program established by FEECA was identified as being reasonable and achievable.

EPA Region IV has contacted EPA Regions VIII and IX and the Bureau of Land Management (BLM) regarding the 2500 MW Allen-Warner Valley project. The sponsoring parties for this project were two California utilities and a Nevada utility. Regions VIII and IX were involved as reviewing agencies under Section 309 of the Clean Air Act and as the PSD permit issuing entities. The Warner Valley plant is in Utah (Region VIII). The Allen plant is in Nevada (Region IX).

In their analysis the California Public Utilities Commission (CPUC) indicated that if there was continued implementation of energy goals (through conservation, renewable resources, solar), the California utilities would not need the additional generating capacity projected for 1989. Subsequently, the California utilities withdrew from the project. The BLM's final recommendation was to permit the Nevada utility's construction of a 2000 MW Allen plant. EPA Region VIII proposed to deny the PSD permit for the Warner Valley plant in Utah because of air quality issues. Neither Region VIII nor Region IX specifically endorsed the Willey model used in the Environmental Defense Fund's analysis of conservation. Based on the CPUC analysis, EPA indicated its preferred alternative to be conservation. Current plans by the utilities are to proceed with 2000 MW of the originally proposed 2500 MW.

4.2 TRANSCRIPT OF PUBLIC HEARING ON DEIS AND RESPONSES TO TRANSCRIPT COMMENTS

Individual comments made during the Public Hearing on the Big Bend Unit 4 DEIS have been identified by an alphanumeric designation that is marked in the margin of the transcript.

Responses to these comments appear at the end of this section.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

A PUBLIC INFORMATION HEARING IN RE:

TAMPA ELECTRIC COMPANY

Draft Environmental Impact Statement; Notice of Proposed Issuance of National Pollutant Discharge Elimination System Permit; Notice of Preliminary Determinations Regarding Prevention of Significant Deterioration; Tentative Findings under Sections 316(a) and (b); Proposed Net Limitations for Slag Pond Effluent; Notice of Consideration for State Certification of the NPDES Permit

Units 1, 2, 3
Proposed Unit 4
Big Bend Station

- -

Time: 7:30 p.m.

Date: August 19, 1981

Location: Recreation Center
901 6th Street
Ruskin, Florida

REPORTING: ANNE JAPOUR, CVR

BAY PARK REPORTING COMPANY
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FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION:

HAMILTON S. OVEN, JR.
Administrator of Power Plant Siting

SPEAKERS:

HEYWOOD A. TURNER
Senior Vice-President/Production
Tampa Electric Company p. 25

GLORIA RAINS
Manasota-88 p. 35

SALLY THOMPSON
Hillsborough Environmental Coalition p. 43

RICHARD T. PAUL
Hillsborough Environmental Coalition p. 44

SPEAKERS (Cont'd.)

MICHAEL KENNEY
Hillsborough Environmental Coalition p. 47

LAURIE MACDONALD RASK
Tampa Bay Sierra Club p. 50

JULIE MORRIS
Florida Sierra Club p. 51

BARNEY CAPEHART
Florida Sierra Club p. 55

P R O C E E D I N G S

(Whereupon, at 7:30 p.m. the public hearing was called to order)

MR. ZELLER:

Well, it's 7:30, and I think I'd like to convene the hearing. If anyone comes in later than this, they'll have an opportunity to register and still be able to participate.

We have a rather lengthy agenda of items to cover as far as the hearing is concerned, so I think it's time to -- time that we begin and get under way.

My name is Howard Zeller, ladies and gentlemen, and I'm the Acting Director of the Enforcement Division for the United States Environmental Protection Agency in Atlanta, Georgia.

With me this evening is Mr. Hamilton Oven, Buck Oven, who represents the Florida Department of Environmental Regulation, and there are a number of other EPA people whose names you see on the agenda that was handed out to you at the time you registered.

The hearing tonight will address the possible actions by EPA with respect to Tampa Electric Company's Big Bend station near Tampa in Hillsborough County, Florida.

EPA is at this time considering the reissuance of a permit for existing Units 1 through 3 and the issuance of a permit for the first time for a proposed Big Bend Unit 4.

The hearing is for the purpose of receiving comments on the Draft Environmental Impact Statement, the proposed reissuance and issuance of a National Pollutant Discharge Elimination System permit and consideration for State certification of the permit.

Under Section 401 of the Clean Water Act, the State of Florida has been requested to certify the proposed NPDES permit will not cause violations of Florida Water Quality Standards.

The Federal Water Pollution Control Act, which is commonly referred to as the Clean Water Act, has as its explicit goal elimination of the discharge of pollutants by 1985. To achieve the goal, the Act has created the National Pollutant Discharge Elimination System or NPDES, which is a national permit program, to control the discharge of pollutants into the nation's waters.

Under the permit program, anyone who proposes to discharge wastes into the waters of the United States must receive a permit setting limits and conditions on the discharge of pollutants. The Act places technology-based limitations on existing discharges designed on an industry-by-industry basis.

The NPDES permit is the basic regulatory tool for water pollution abatement under the federal law. This discharge must be in compliance with its permit effluent limits upon initiation of its discharge. Any violation of the terms, the limits, or violations of the permit will subject the discharger to civil or criminal penalties.

Now, due to the aforementioned administrative procedures required for existing sources -- that is, Units 1 and(sic) 3 -- and the new source, Unit 4, there were separate applications submitted to EPA, and there are separate application numbers; all of that information is available to you on your fact sheet.

However, we do not intend to issue two permits as far as the Big Bend station is concerned. We will issue only one permit after completion of the Environmental Impact assessment procedures that are applicable to the new source; that is, Unit No. 4.

Based upon initial evaluation of applicable standards of performance for new sources and Florida Water Quality Standards' requirements, EPA notified the applicant -- that is, Tampa Electric Company -- that offstream cooling would be required for Unit No. 4. However, following a request for alternative limitations, which are allowed under Section 316 of the Federal Water Pollution Control Act, EPA has tentatively determination -- determined that once-through cooling is acceptable provided that the applicant installs fine-mesh screens on the intake structures for Units 3 and 4 to prevent any increase in the entrainment of marine organisms.

The Draft NPDES permit proposed for Big Bend

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station was prepared by the staff of Region IV, EPA, using applicable guidelines and standards for the steam electric power generating point source category and the Florida Water Quality Standards' requirements.

We made available for distribution this evening copies of the public notice and the fact sheet. A few copies of the Draft Environmental Impact Statement are available also. Each of these documents, as well as other relevant documentation, and all comments received tonight or submitted in writing by December 2nd(sic), 1981, will become a part of the administrative record of this hearing.

The information in the record will be used in evaluating the Draft permit and either preparing a final NPDES permit or denying the applicant a permit for the existing and/or proposed discharges.

Permit issuance would occur after release of the final Environmental Impact Statement.

Now, in addition, you should be aware that all public comments on the TECO Big Bend facility and the Draft EIS, whether received here tonight and transcribed for the record or submitted in writing directly to EPA, will be summarized, and all of these issues will be addressed in the final Environmental Impact Statement.

A copy of the proposed permit will also be included in the final Environmental Impact Statement.

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Now, a permit, under the Prevention of Significant Deterioration program of the Clean Air Act, will also be required for Big Bend Unit 4. A revised preliminary determination with regard to that permit was published with the Draft Environmental Impact Statement. The comment period on that permit closes on September 2nd, 1981, after which time a final determination may be issued.

This hearing is an EPA public information hearing, and it's conducted pursuant to 40 CFR 124.42(b) of our regulations. Notice of the public hearing was published in the Sarasota Herald Tribune and the Tampa Tribune on July 16th, 1981. Additionally, copies of the public notice were mailed to all individuals and organizations on EPA's mailing list in Florida and to all appropriate government agencies. A copy was posted in the Ruskin Post Office for thirty days.

At this time I'd like to ask Hamilton Oven, Florida Department of Environmental Regulation, to make any comments he has concerning the 401 certification.

Mr. Oven?

MR. OVEN:

Thank you, Mr. Zeller.

My name is Hamilton S. Oven, Jr. I'm the Administrator of Power Plant Siting for the Florida Department of Environmental Regulation. As such, it's been my duty to review an application made to the State of Florida for certification

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pursuant to Florida law.

The Power Plant Site Certification program is a one-stop permitting process, which encompasses all State permits. As such, we have reviewed the water quality aspects. We have coordinated our conditions of certification with EPA in order that a valid 401 certification can be issued.

In reviewing the application, we noted that due to ambient conditions in Tampa Bay, there will be certain occasions when Tampa Electric Company would not be able to comply with the Florida Water Quality Standards.

Tampa Electric Company then applied for a variance to Florida Water Quality Standards. Their request was considered at a certification hearing held in Tampa on June 23rd, 1981. The Hearing Officer took the recommendation of Tampa Electric Company and the Department under advisement and recommended to the Governor and Cabinet that this variance be granted, and that variance was approved by the Governor and Cabinet when they approved the certification of the power plant on August 4th of 1981.

So with that, the Department would be able to certify to the 401 compliance. The Department also reviewed the 316(a) and 316(b) provisions of Public Law 92-500. We concurred with EPA that the use of fine-mesh screens on Units 3 and 4 would solve the problem and meet the Best Available Technology as far as the issue of excessive entrainment

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was concerned. The Department was somewhat uncertain of whether or not that the data provided from Tampa Electric Company satisfied all of our requirements as far as 316(a). We've addressed that in our conditions of certification by requiring a better model to determine the size of a thermal mixing zone and also some additional biological studies.

The Department also will be submitting a certification under 401 and Section 404, United States Army Corps of Engineers, as far as some of the dredging activities associated with the power plant.

We concurred with EPA as far as the PSD and BACT provisions of the Clean Air Act are concerned.

The State of Florida has certified Tampa Electric Big Bend 4. The State of Florida has also considered the variance request for Units 1, 2, and 3. A Hearing Officer's report recommending that variance be granted has been received by the Department. It is being processed by the Department; it's anticipated within the next couple of weeks that that variance for Units 1, 2, and 3 will also be approved.

MR. ZELLER:

Thank you, Mr. Oven.

Let me --- Let me correct something for the record. Ms. Hanson just pointed out to me that I erroneously stated on the -- based on the hearing record, that it would be closed on December 2nd. That should be, of course, be September 2nd, so please correct the record accordingly.

Next I'd like to ask Mr. Dario Dal Santo with the Environmental Protection Agency to please come forward. Mr. Dal Santo is with the Environmental Impact Statement Branch. He's been Project Officer on this project for a number of years and will give you some background information relative to the EIS process and the National Environmental Policy Act.

Mr. Dal Santo?

MR. DAL SANTO:

Thank you, Mr. Zeller.

Good evening. I am Dario Dal Santo, and I've been the Project Officer for the Environmental Impact Statement on the Tampa Electric Company's proposed Big Bend Unit 4 complex.

The proposed unit will have a net generating capacity of 417 megawatts and will be located at the existing Big Bend complex along Hillsborough Bay in Hillsborough County, Florida.

What I would like to do this evening is briefly outline the NEPA process and the EIS process without going into details of the Environmental Impact Statement.

Under provisions of the National Environment Policy Act of 1969, which we call NEPA, an Environmental Impact Statement, which we designate as an EIS, must be prepared for all major federal actions which may significantly affect the quality of the human environment.

Operation of Big Bend Unit 4 would require a National Pollutant Discharge Elimination System permit. As Mr. Zeller said, this is the NPDES permit.

The EPA Region IV Administrator had determined that the proposed Unit 4 would be a new source, as defined by Section 306 of the Clean Water Act, and issuance of a new source NPDES permit is a major federal action significantly affecting the quality of the human environment and, therefore, is subject to the provisions of NEPA.

Consequently, the EIS has been prepared, and notice of its availability was published in the Federal Register, Volume 46, on July 17, 1981.

The purpose of the EIS is to provide government agencies and the public with information to assure that an appropriate and thorough review of the environmental impacts of a proposed action are included in the decision-making process.

The EIS was prepared using the third-party EIS process. Under this arrangement, Tampa Electric Company retained a consultant to prepare the EIS, subject to EPA guidance and direction.

NUS Corporation was nominated by Tampa Electric Company, and EPA approved this nomination. However, the ultimate responsibility for the EIS remains with EPA.

In accordance with the Council of Environmental Quality guidelines for implementing the National Environmental

Policy Act, the Draft EIS emphasizes the principal issues, alternatives, and impacts associated with the proposed project.

Accompanying the Draft EIS are two technical support documents or technical reference documents, which contain the detailed analyses that were used in the preparation of the summary document. This is consistent with CEQ guidelines.

The CEQ guidelines specify that an EIS should focus on the major issues associated with the proposed project and that less emphasis in the EIS should be devoted to less important issues.

The major issues associated with the proposed Big Bend project included cooling water system alternatives and air emissions control. Other systems of alternatives addressed in the EIS included siting, wastewater treatment, residual waste disposal, and electric generating management.

Several measures, which would mitigate the environmental impacts of the proposed project, were identified during preparation of the EIS, and these measures were made conditions of the NPDES permit that is proposed, tentatively proposed, to be issued, and include: implementation of a groundwater monitoring program for the assessment of leachates from coal pile, wastewater treatment areas, and residual waste disposal areas; implementation of a construction erosion and sedimentation control program; implementation of a biological monitoring program to fully evaluate survivability of organisms in the fine-mesh screens and the organism return mechanism and on the benthos of Tampa Bay; preservation of a mangrove swamp along the southwestern coastal portion of the Big Bend complex; and posting of signs in the discharge canal to warn boaters of the presence of the West Indian Manatee, which is an endangered species.

Any comments you may have on the Draft EIS or the permitting decision will be appreciated. Comments should be forwarded to Mr. John E. Hagan of EPA, Region IV, at the address listed at the bottom of the agenda.

As noted, the comment period will remain open through the 2nd of December -- 2nd of September. Excuse me.

MR. ZELLER:

Not you, too.

(Laughter)

MR. DAL SANTO:

A final EIS will be published after close of the comment period. The final EIS will consist of the Agency's statement of findings, tentative permit decisions, substantive comments on the Draft EIS, and responses to the comments, transcript of this hearing, and any additional evaluations performed since publication of the Draft EIS.

If you wish to retain a complete evaluation of the project, you should keep a copy of the Draft EIS, since we will not republish verbatim the contents of the Draft EIS.

Thank you.

MR. ZELLER:

Thank you, Mr. Dal Santo.

Next I'd like to ask Charles Kaplan to make a brief statement relative to the NPDES permit; Mr. Kaplan, who's Chief of our unit that handles power plant permits and synthetic fuel permits.

Mr. Kaplan?

MR. KAPLAN:

Thank you, Mr. Zeller.

Good evening, ladies and gentlemen. My name is Charles Kaplan. I'm employed by the U.S. Environmental Protection Agency as Chief of the Power Plant and Synfuel Unit in the Enforcement Division for Region IV office. I'm headquartered in Atlanta, Georgia.

It is my principal responsibility to draft National Pollutant Discharge Elimination System permits for power plants in the Region IV area. For brevity, we usually speak of these as NPDES permits.

At the registration desk there are copies of both the public notice and the fact sheet for the facility. The fact sheet contains the proposed effluent limitations and special requirements as well as the permit rationale for the Big Bend station NPDES permit. The draft NPDES permit and rationale are also included in the Draft Environmental Impact Statement.

As Mr. Zeller has previously indicated, EPA is proposing to grant an NPDES permit to TECO for its wastewater discharges from the existing three units and the proposed Unit 4 at the Big Bend station.

The application for the existing units describes six discharges to the plant intake and discharge canals, and the application for Unit 4, which proposes six additional discharges also to these same canals. All twelve discharges ultimately enter Hillsborough Bay.

Under the provisions of the Clean Water Act, a liquid waste discharge from a steam electric generating facility to waters of the United States must meet two different sets of criteria.

The first is that the effluent must meet the requirements of the Effluent Guidelines and Standards for the Steam Electric Point Source Power Generating Category. These were promulgated on October 8th, 1974. They're contained in Title 40, Part 423, of the Code of Federal Regulations.

In effect, this first set of criteria requires the applicant to provide a base level of treatment technology which is required for all similar steam-electric generating facilities.

The second requirement is that the discharges, individually or in conjunction with other discharges into the various receiving waters, must not violate the Florida Water Quality Standards. This requirement provides for inclusion of more sophisticated treatment technology as necessary to protect the water quality of the receiving water body. These are determined by criteria adopted by the State of Florida.

In addition to the two sets of criteria I've indicated, EPA proposed certain amendments to the steam-electric guidelines in October 1980. This proposal addressed both toxic pollutants and what are called priority pollutants.

Application of all these requirements to both the existing and the proposed discharges from the Big Bend station is in the form of effluent limitations and special conditions, which I've indicated are included in the Draft permit and described in the fact sheet.

The Draft permit contains limitations on the amounts of pollutants, such as total suspended solids, oil and grease, total residual oxidants and heat, which may be discharged.

The fact sheet contains copies of the proposed effluent limitations and the special conditions which are designed to assure that construction of Unit 4 and operation of all four units is done in an environmentally-acceptable manner.

As stated in the public notice, all pollutant limitations and other permit conditions are tentative and still open to comment through September 2nd.

In reviewing the application for the Big Bend station, two unusual situations were presented. Both are due to high levels of ambient pollutants present in Hillsborough Bay waters. Bay water is used for sluicing the ash slag to the settling pond for the three existing units. On occasion, high background levels of total suspended solids are carried into the pond, and some continue out the effluent. Therefore, an evaluation of intake and effluent solids, as well as heavy metal concentrations, was undertaken. This evaluation has led EPA to propose effluent limitations which would allow a credit for carry-over of solids present as the background in the intake water.

The second situation was a result of the various heavy metals in the ambient intake water in concentrations which already exceed levels prescribed by the Florida Water Quality Standards.

Use of bay water for ash sluicing results in a small addition of the various heavy metals to the effluent, particularly arsenic, chromium, iron, and selenium. Small additions can also be expected from some of the Unit 4 discharges.

Since the ambient levels are already high, either additional treatment would be required or a variance to the Water Quality Standards would be necessary for the effluents from the Big Bend station to be in compliance with the Florida Water Quality Standards.

As Mr. Oven has indicated earlier, the State of Florida has granted a variance to TECO for the Unit 4 discharges for a two-year period. Further, the State has proposed a two-year variance for the ash -- slag pond effluent for the existing units.

During this two-year period, additional monitoring is to be required, as well as an evaluation of the available treatment technologies to reduce the level of pollutants discharged from the slag pond and the other sources from Unit 4.

As I close, I wish to indicate that EPA is presently reviewing these variances, proposed variances, to the standards, and our concurrence or our evaluation will be included in the final Environmental Impact Statement.

Thank you very much for your attention.

MR. ZELLER:

Thank you, Mr. Kaplan.

The final speaker on the agenda for the Environmental Protection Agency is Delbert Hicks. Mr. Hicks is an aquatic biologist, and he will address those functions of 316(a) and 316(b), which I mentioned earlier, which generally deal with thermal discharges from the power plant as well as what impact the entrainment of organisms may have on the intake structure.

Mr. Hicks?

MR. HICKS:

Thank you.

For the record, my name is Delbert B. Hicks. I'm employed as a senior aquatic biologist with the Environmental

Protection Agency. I'm assigned to the Surveillance and Analysis Division, stationed in Athens, Georgia.

My purpose tonight is to provide a brief overview of the historical assessments that have accompanied the growth of the Big Bend facility over the last six or seven years.

My technical involvement with the Big Bend facility dates back to 1973 when the Tampa Electric Company was planning construction of Unit 3. In May 1976, Unit 3 was placed into operation, but prior to this date, the company initiated technical studies to evaluate the environmental impacts associated with the operation of Units 1, 2, and 3 at the Big Bend site.

These units employed a dilution assist, once-through cooling system, that was viewed as rather unique for this particular area.

The studies commenced in January 1976 and continued through March 1977. The results of these efforts were published by TECO in September 1977 and provided to the Regional Administrator of Region IV for evaluation.

Based on the technical facts presented, the Regional Administrator determined that the thermal discharge from the combined Units 1, 2, and 3, with the benefits of a dilution assist cooling system, was not causing an unacceptable adverse impact to Hillsborough Bay and Tampa Bay .

However, the Regional Administrator further determined that the location and the capacity of the cooling water intake structure, including the dilution pump system, was a major factor causing an unacceptable level of entrainment and therefore failed to reflect the best technology available for minimizing adverse environmental impacts.

And for those of you who are not familiar with the concept of entrainment, we're speaking of a consumptive process that removes biological properties from the water; that is, the eggs, the larvae, ~~the~~ of fish and shellfish.

The Tampa Electric Company responded to the above determination by the Regional Administrator with a proposal to terminate the use of the dilution assist cooling system and provide for studies to assess the biological and associated thermal consequences of such an action.

Retirement of the dilution system would reduce the withdrawal capacity of the Big Bend facilities, Units 1, 2, and 3, by 36 percent and potentially effect a proportional reduction in the level of entrainment measured. The Regional Administrator viewed the company's proposal as a viable means to establish a new basis from which to reassess the impact of entrainment at this facility.

With the shut-down of the dilution assist cooling system, the company demonstrated, through results of biological studies, that the associated thermal rise of the discharge did not cause substantial and unacceptable thermal impacts in

Hillsborough Bay and Tampa Bay. Based on these findings, the Regional Administrator further determined that the retirement of the dilution assist cooling system provided for a significant reduction in entrainment by minimizing the cooling water capacity required by the Big Bend facility.

Therefore, the Regional Administrator determined that the operation of Units 1 through 3 with the conventional once-through cooling mode, without the benefit of dilution, dilution assist cooling, resulted in a maximum level of entrainment acceptable for the Big Bend facility.

Based on these findings, the operation of a fourth unit at the Big Bend site would require installation of an intake system designed to limit entrainment impacts to levels currently associated with the operation of Units 1 through 3 and without the use of dilution cooling.

In response to the above, which established the maximum entrainment impacts acceptable for the Big Bend site, the company, Tampa Electric, assessed the applicability of various intake technologies that would minimze entrainment impacts on the biota of Hillsborough and Tampa Bay.

From these efforts, the company determined that a relatively new technology, known as fine-mesh screening, had potential application at the Big Bend site. Accordingly, the company proceeded with preliminary experiments which led to the construction of a full-scale prototype traveling intake screen which included all features of an in-service installation.

The effectiveness of this design to successfully screen fish eggs, fish, and shellfish larvae from the intake water and return to organisms -- return the organisms to Hillsborough Bay was deemed a viable state and was tested further.

In May of 1981, the final results of the company's testing of the fine-mesh screening device was provided to EPA for evaluation.

Based on the facts presented by the company, the Regional Administrator determined that the fine-mesh screening of intake structures is a viable technology that would minimize entrainment effects. Therefore, the installation of fine-mesh screens on Big Bend Unit 3 and 4 would provide for entrainment effects approximately equal to the current impacts associated with the operation of Units 1, 2, and 3, with conventional intake technology.

The detailed results of the findings referred to above, of course, will be found in the EIS when published.

Now, with the construction of Unit 4 and to ensure that the installation and the operation of the in-service fine-mesh screens attain the goals of entrainment minimization, the efficiency of these installations on Units 3 and 4 will be studied with results provided to EPA for evaluation.

Also, because the operation of Unit 4 will add to the heated discharge to Hillsborough Bay, biological studies will be conducted at an appropriate time to assess any impact due to these discharges.

Thank you.

MR. ZELLER:

Thank you, Mr. Hicks.

This generally concludes the statements by the involved government agencies and EPA staff people involved.

We'll now proceed with the real purpose of this evening hearing, and that's to receive public comments.

The goal of the Clean Water Act and the National Environmental Policy Act is to encourage and provide for public participation in the decision-making process for actions legislated by these acts and to encourage government responsiveness to public concerns and to promote a greater public awareness of the actions proposed by the Environmental Protection Agency.

We've asked all of you to register so that we may have a record of those that are here in attendance and also so that we can send you a notice of our determination regarding the permit.

If you've not already registered and you wish to make an oral statement tonight, please indicate your intent at this time. I have a number of people who have already done so. If there's anyone else who would like to make a statement, why, please let me know. If you have a lengthy written statement, I'd like to ask that your oral presentation be summarized if at all possible. Your oral presentation should be limited to about seven to ten minutes or less if possible.

Now, Mr. Oven or I may ask questions of the persons presenting oral comments where we feel like it's necessary to clarify the nature or substance of those comments.

I'd like to emphasize that persons commenting for the record will not be expected nor required to respond to questions from the public.

On the other hand, since the purpose of this hearing is for public information, I want to make sure that everyone here, if you have a question, that you make it available to the Chair, and either I will try to respond to it or see that someone can answer it, because I think it's extremely important that you understand all of the aspects of this complicated process that's underway.

Now, I want to ask each person making a statement to please step up to that microphone, state his or her name and the interest or organization that you represent.

The hearing is being recorded by a court reporter, and a transcript will be included in the public record of the final EIS. In addition to any oral or written comments submitted this evening, the period on the Draft EIS will remain open until September 2nd, 1981.

The written record of the hearing and any other comments received will be held as a matter of public record in the Regional Office of EPA in Atlanta.

Now, at this time, as the first speaker relative to public comments, I would like for the Tampa Electric Company representative who is going to make a statement, to please do so at this time.

MR. TURNER:

Thank you, Mr. Zeller.

My name is Heywood Turner, Senior Vice-President/ Production with Tampa Electric Company, and I reside in Tampa, Florida.

Before I begin my prepared comments, if I may, I've got a couple of items that I'd like to present to the Chair for the record. These consist of, first, Florida Public Service Commission Order No. 9749 dated January 16, 1981, together with the Florida Public Service Commission final report with regard to the certification of Big Bend Unit No. 4.

So, if I may, Mr. Zeller ---

MR. ZELLER:

Yes.

MR. TURNER:

Secondly, we have to present as comments on EPA's preliminary determination of Big Bend Unit No. 4 PSD application, I have three brief comments that I would like to read and then enter into the record if I may.

MR. ZELLER:

You may.

MR. TURNER:

TECO-1

The first comment is found in Section E-5 and reads as follows: In the discussion of BACT for NO$_x$ and CO, the sentence -- in quotation marks -- An attachment to this preliminary determination summary specifies combustion control requirements to balance the trade-off between NO$_x$ and CO emissions through the use of a flue gas, oxygen, or CO$_2$ monitor -- closed quotes.

This portion should be deleted since the attachment and requirements have been deleted from the preliminary determination, as noted in the response to comment no. 3 on page E-23.

TECO-2

Secondly, E-14, condition no. 11, the applicant will demonstrate compliance with the NSPS requirements for percent reduction of potential sulfur dioxide emissions by monitoring coal characteristics, flue gas, sulfur dioxide content, and through other procedures established in 40 CFR Subpart D(a) -- as discussed on page E-4 -- the BACT analysis assumes a 25 percent reduction in potential sulfur dioxide emissions -- sulfur dioxide underlined -- not, parenthetically, sulfur underlined -- through coal washing and preparation.

This assumption was based on coal washing data indicating 25 percent reduction is possible. However, should the coal washing and preparation not always provide a 25 percent or greater reduction in potential SO_2 emissions, flexibility has been designed into the control equipment to achieve an overall reduction of potential SO_2 emissions of 90 percent.

TECO-2

For these reasons, condition no. 11, we feel, should be deleted. And lastly, page E-17, table 1, potential emissions of SO_2, should read 15,552 tons per hour to reflect the 0.82 pounds SO_2 per million BTU emission rate. That is included in the preliminary findings, I believe, Mr. Zeller, if I may submit these.

TECO-3

MR. ZELLER:

Thank you.

MR. TURNER:

I've prepared a brief statement that I would like to present to you at this time. As I said, my name is Heywood Turner, and I reside in Tampa, Florida, and I'm Senior Vice President of Production with Tampa Electric Company.

We welcome this opportunity to appear at this joint hearing as the applicant for the various permits necessary for continued operation of Tampa Electric Company's Big Bend generating station and construction and operation of the proposed addition of Big Bend Unit No. 4.

Since the new unit is the primary subject of the Draft Environmental Impact Statement that has been issued by Region IV of EPA, my comments will be directed to that unit.

Of course, the renewal of the NPDES permit for the existing Big Bend station is also of significance to the company, and I will briefly address that as well.

By way of background on Unit No. 4, the issues that we're here to address tonight are actually a part of three major areas of government authorizations which are required under various statutes and regulations for a new power plant facility.

Two of these authorizations have already been obtained by Tampa Electric Company. The first approval received was the determination that there is a need for Big Bend Unit No. 4 in the State of Florida. That determination was made by the Florida Public Service Commission on January 16, 1981. I'll be discussing that in a little more detail later in my comments.

The second major authorization obtained by the company is the certification of the site of Big Bend Unit No. 4 by Florida's Governor and Cabinet under the Florida Electric Power Plant Siting Act. That certification was granted at a public hearing held by the Governor and the Cabinet in Tallahassee, Florida, on August 4, 1981.

Tampa Electric Company -- to give you a little background about the company -- was originally chartered in October of 1899 and was reincorporated in 1949 and became a wholly-owned subsidiary of TECO Energy, Incorporated, in April of this year, 1981.

The company is an investor-owned, tax-paying electric public utility serving Hillsborough and portions of Polk, Pasco, and Pinellas counties.

Within that service area we serve customers within the municipal limits of the cities of Tampa, Plant City, Temple Terrace, Winter Haven, Auburndale, Lake Alfred, Eagle Lake, Mulberry, Dade City, San Antonio, and Oldsmar. We currently have more than 318,000 customers. As I have noted, we are regulated by the Florida Public Service Commission.

The present generating capacity of the company is 2,475 megawatts. Of that total, 1,615 megawatts is coal-fired capability. The last addition to the system that was placed in service was Big Bend Unit No. 3, which began commercial operation in 1976.

Tampa Electric Company has built, maintained, and operated its electric system with the primary goal of providing reliable service to its customers at the lowest possible price.

Our principal role is now and has been to respond to electric power needs of our customers in a manner which will provide efficient capacity to ensure reliable service.

It is our judgment that Big Bend Unit No. 4 is required by the projected April 1985 in-service date to ensure a reliable cost-effective supply of energy for Tampa Electric Company's customers.

The Big Bend generating station, which is the subject of this public hearing, is located on the eastern shore of

Hillsborough Bay approximately five miles north of Ruskin, ten miles south of Tampa, and fourteen miles from St. Petersburg across the bay.

The station currently consists of three coal-fired generating units known as Big Bend Units 1, 2, and 3. The proposed new unit will be the fourth unit at the existing site and will utilize many of the service facilities that are associated with the existing units.

The shared facilities include such things as the coal dock, unloading facilities for coal, coal storage area, the existing wastewater treatment pond, and spray irrigation field.

The existing transmission line towers will be utilized by Unit No. 4 so that there will be no need for new transmission towers to accommodate this new unit.

Big Bend Unit 4 is designed to have a gross generating capability of 486 megawatts. The number of 417 megawatts was mentioned previously; that was the net capability of the machine. The number I cite here of 486 is the gross capability of the machine.

In accordance with state and federal statutes and regulations, this unit will be equipped with a flue gas desulfurization system or stack gas scrubber to control the emission of sulfur dioxide to the atmosphere. It will also be equipped with an electrostatic precipitator to control emissions of particulate matter to the atmosphere.

These systems consist, in our judgment, of what is often referred to as a state-of-the-art technology and have been thoroughly investigated by the company to ensure that both reliable and economic operation will be possible.

We are convinced, based upon our evaluations, that these systems constitute the best technology that's currently available in the market for the removal of these parameters.

For the entire Big Bend station, including proposed Big Bend Unit No. 4, a concern has been expressed by state and federal agencies and other groups about the impact of the station on the bay. Mr. Hicks was referring to this moments ago.

Tampa Electric Company has utilized a once-through condenser cooling system for the existing station, and the same type of system is proposed for Big Bend Unit No. 4.

To address these concerns, extensive studies were performed in Hillsborough and Tampa bays. These studies included assessments of the impact of the heated discharge water on living organisms in the bay as well as assessments of the impact on those organisms of drawing the water into the plant.

Based upon our evaluations and in consultation with both the Department of Environmental Regulation and EPA, it was determined that impacts that may occur as a result of the use of once-through cooling for this station could be substantially mitigated if a fine-mesh screen system is incorporated into the plant cooling water intake structure.

The prototype or model of the fine-mesh screen system was constructed and operated to determine the effectiveness of this new technology for the Big Bend station.

Based upon these studies, EPA has tentatively determined that the installation of fine-mesh screens on proposed Unit No. 4 and on existing Unit No. 3 will be sufficient to ensure that the potential impacts are at an acceptable level and once-through cooling may be utilized at the site.

Other environmental safeguards will be employed at the site to ensure that non-reusable byproducts that are produced as a result of the generation of electricity in a coal-fired facility are disposed of in a responsible and safe manner.

These are all addressed in the Draft EIS.

As I pointed out earlier, since the proposed Unit No. 4 is a new unit, the Florida Public Service Commission was required to assess the need for the additional generating capacity.

To demonstrate the need for Big Bend Unit No. 4, the company conducted studies on projected customer growth, energy demands, conservation, alternate energy sources, and available system capacity and reserves.

After evaluating the relevant data, the Florida Public Service Commission certified the need for the unit. We firmly believe that the Public Service Commission decision is correct and the addition of Big Bend Unit No. 4 to Tampa

Electric Company's generating system will ensure that the energy demands forecasted for the in-service date of April 1985 and beyond that date can be met in a reliable, responsible, and cost-effective way.

One further point that should be -- should not be overlooked is that the addition of coal-fired generating capacity is consistent with both the Public Service Commission rules and the national energy policy of reducing reliance on foreign oil. Big Bend Unit No. 4 will displace oil generation in the State of Florida.

In summary, Tampa Electric Company and the responsible state and federal agencies have thoroughly studied and evaluated the environmental, economic, and other consequences of constructing and operating Big Bend Unit No. 4.

We believe that these evaluations clearly demonstrate that the necessary permits and authorizations should be granted as expeditiously as practicable.

We support the issuance of the National Pollutant Discharge Elimination System permit, the Prevention of Significant Deterioration permit, and the finalization of the Environmental Impact Statement for this unit.

We also strongly support the issuance of the renewal National Pollution(sic) Discharge Elimination System permit for Big Bend Units 1, 2, and 3, which has been proposed by EPA, and we urge that the Department of Environmental Regulation certify that permit as required by the Clean Water Act of 1977.

I've been reading; this is obvious to you. Now I'd like to talk, if I might, for just a minute.

This permitting process has been a long pull for lots of people. Without the diligence, help, and assistance of folks in Region IV, folks in the State of Florida, DER, these gentlemen and your staffs, we'd probably not be here tonight.

I'd like to thank each and every one of you personally for the cooperation. We had some differences, too, but it went well. I think we've come to a point where we can go back and say a lot of work has been effectively done, and if you'll allow me, I'd like to also make that same thanks to many folks in Tampa Electric Company who have worked diligently toward the end of arriving at the August permit for Big Bend Unit 4.

Thank you, Mr. Zeller.

MR. ZELLER:

Thank you, Mr. Turner.

Next I'd like to move on with those individuals who have indicated they would like to make a statement. The first card that I have, based on the time of registration, is from Ms. Gloria Rains. Ms. Rains is Chairman of Manasota-88.

Ms. Rains, nice to see you again.

MS. RAINS:

Thank you. I am Gloria C. Rains of 5314 Bay State Rd.

Palmetto, here to represent Manasota-88, a bi-county organization dedicated to the preservation of environmental health.

Basically, after reviewing the TECO Draft EIS, members of Manasota-88 conclude the following: It is by no means certain that Big Bend Unit 4 is needed.

Based on investigation by the Public Service Commission, it has been determined that the Florida peninsular kilowatt hour capacity is sufficient without Big Bend 4, in light of the anticipated attainment of Commission conservation goals.

GCR-1

Even in TECO's more limited service area, TECO's reserve margin will still be 11.7 percent for the winter of 1988-89. The recommended reserve margin of 23 percent or so could probably be readily attained if TECO actively pursued long-term power purchases outside Florida, which they admit they have not done in depth.

While such a step may not provide the economic infusion to TECO they desire, our concern is not with providing a broader margin of profit for TECO but with providing a safe, productive environment for Tampa Bay residents.

There is little doubt TECO's reserve margin could be even larger. Rather than continuing to provide preferential power rates to industry, primarily the phosphate industry, whose present consumption is currently about 23 percent higher than residential consumption, industrial conservation could be encouraged by charging industrial users the true cost of electricity. This is important since industrial demand at preferential rates will continue to exceed, although at a lower percentage, domestic consumption through year 2000.

If TECO showed the same interest in conservation that they parrot to their residential consumers, they would have a rate schedule that urges conservation which would eliminate need for a new unit, if indeed one exists.

In any case, the residents of peninsular Florida, if Public Service Commission goals are achieved, as seems most probable, do not need the addition of Big Bend Unit 4.

Elimination of the proposed expansion will still result in reserve margins of 33.7 percent in the winter of 1988-89, well over the recommended reserve margin.

Achievement of the PSC conservation goals will remove any need for Big Bend Unit 4 from an adequacy view. It should also be noted that even without attainment of conservation goals, an unlikely event, it is possible an adequate reserve margin could still exist.

We believe existing facts substantiate that the construction of the proposed unit is not the most efficient way for TECO to provide adequate power to its service area customers.

GCR-2

As far as the so-called socioeconomic benefits of Big Bend 4, we believe those listed in the Draft are more than offset over the long term by the addition of toxic metals into our surface waters, degradation of our groundwater from toxic and radio(sic) leachate and the adverse health and economic impacts which will occur as a result of dumping additional pollutants, tons of pollutants, into our environment. GCR-2

Further, construction of the plant and the ensuing excess capacity it creates will be reflected in even higher monthly TECO electric bills that will have to be paid for by the individual consumer. GCR-3

If the proposed unit is constructed, it will be sited in an area affected by big waves during flooding periods, meaning many of the toxic solid wastes, contaminated water from waste ponds, etcetera, could be washed into the bay, further contaminating our surface waters. GCR-4

It is also questionable that the expansion of a plant already located in a high-risk area is in local, state, or national interest.

The adverse impact of the unit on air quality is obvious. As you know, a portion of Hillsborough County located approximately 5.3 kilometers from the Big Bend plant has been designated a particulate non-attainment area. All of Hillsborough County is an ozone non-attainment area. Part of Pinellas County to be impacted by the plant is a sulfur-dioxide non-attainment area. Yet, the plant will add additional nitrogen oxides into the air, certain to make the ozone levels worse. GCR-5

Sulfur dioxide levels will be increased by between 12,000 to 24,000 tons per year, certainly not helping the sulfur dioxide problem in Pinellas, Hillsborough, and other adjoining counties.

GCR-5

While, because of the application's timing, increases in particulate matter emissions from fugitive sources have not been considered, they will most certainly have a detrimental impact on air quality. At a minimum, these levels will increase by 1,020 tons per year.

Permitted emissions of particulate matter will result in increased particulate emissions of 568-plus tons per year. Permitting this unit will make a bad air quality region even worse, increasing morbidity and mortality levels and further adversely impacting the quality of life of area residents.

GCR-6

Surface and groundwater quality, already exceeding state water quality standards in some areas, will be permitted to become even further contaminated.

GCR-7

Major groundwater contamination sources from this site will include the coal storage area, the sludge ponds, and the landfill site. Poor quality surface runoff and leachates generated in addition to the existing three units at these locations will seep into the underlying aquifer. Movement of leachate will be toward the Tampa Bay system due to natural groundwater flow. Yet, there is no recommendation for the bottom ash and gypsum disposal areas to be lined.

GCR-8

A minimum 357,380 tons of solid waste will be generated each year consisting of bottom ash, economizer ash, fly ash and gypsum. Although it is stated some may be disposed of commercially, it is well known that this type of gypsum and fly ash are not really suitable for use in wall board, crops, etcetera.

GCR-9

Most probably, all of the toxic and radioactive material will be dumped into on-site landfills and waste ponds where it will leach into the groundwater. This seepage will introduce radionuclides and other potentially harmful elements into the growth medium of local vegetation. It will further degrade the water quality of the surficial aquifer, which, at the Big Bend site, already exceeds EPA standards for chloride, sulfate, manganese and total dissolved solids and exceeds the suggested standards for arsenic.

The permit says there shall be no discharge from the runoff from the gypsum storage or disposal areas. Yet, the EIS says low volume wastes and metal cleaning wastes are discharged to waste ponds for evaporation and percolation where they will seep downgradient into surface waters.

GCR-10

Total suspended solids present in the plant water will be passing through the slag ponds in concentrations which exceed effluent limitations.

Further, permitting, as is proposed, the discharge of heavy metal pollutants when ambient levels of arsenic, cadmium, chromium, copper, iron, mercury, nickel and selenium already exceed Florida Water Quality Standards will not only violate the water quality standards; it would also appear to clearly violate the intent of the Clean Water Act. Such discharges will also cause serious additional degradation of area waters and have the potential to adversely impact human health. GCR-10

We can find no sound reason to provide the applicant with a variance to violate standards for two years. The applicant should absolutely be required to provide additional treatment of their wastewater in order that there be no further violation of water quality standards in the area. GCR-11

How is the applicant, as it is stated in the Draft, going to take all reasonable steps to minimize adverse impacts to waters of the United States when you permit him to violate water quality standards for heavy metal pollutants?

We know that the thermally-affected region associated with the Big Bend facility has suffered decreases in animal abundance and species diversity and a general decline in the quality of the bentho macro-invertebrate community has occurred. GCR-12

The addition of Unit 4 will increase the heat load to Hillsborough Bay by approximately 33 percent, providing an enlargement of benthic areas presently subject to adverse effects, again making a bad situation worse.

GCR-13 The use of fine-mesh screening as an intake device to reduce mortality of fish eggs and invertebrate larvae would

GCR-13

result in a minimum mortality of 44 percent. Further, it is not even really established that this screening device will enhance the survival of fish and larvae. It should also be noticed -- noted the entrainment impacts associated with Unit 4 are approximately equal to the total impacts associated with operations of Units 1, 2, and 3.

GCR-14

It should also be noted that the unit will contribute to the acid rain problem.

In summary, then, you're proposing to issue permits which will require variances because certain standards are not presently being met. This, in order for a plant to be constructed that is probably not needed and is going to cost the residents of this area dearly in increased utility bills, adverse health impacts and environmental impacts.

GCR-15

We think this is in violation of at least the spirit of the Clean Air Act and the Clean Water Act. It is certainly not in the long-term national, state, or local interest to destroy more of our commercial and sports fishing industry, aid in the further destruction of our air and water quality which will further erode adjacent areas, tourist and retirement economic base, increase health costs and through support of an unneeded facility result in an economic negative when investment of money is needed elsewhere in our economy.

GCR-16

If the plant is permitted anyway, we would suggest, rather than waiting two years, the terms of the NPDES permit should require that control systems, such as reverse osmosis or chemical treatment, be used to reduce the levels of metals in discharge of effluents containing toxic metals.

GCR-16

The gypsum pond and bottom ash disposal areas, etcetera, should be lined, although this is far from a foolproof situation.

We should also add, as far as finding any security from the so-called reopener clause found in Part III-D, once the plant is permitted, these permits are not going to be significantly changed; nor, based on our experience, will there be any extensive, meaningful clean-up of operations.

Thank you very much.

MR. ZELLER:

Thank you, Ms. Rains.

Next I'd like to ask for Sally Thompson, who is Chairperson of the Hillsborough Environmental Coalition.

Ms. Thompson?

(Pause)

MR. ZELLER:

Go ahead. That's a recording device; that's not a speaker.

MS. THOMPSON:

Oh, okay. There's not a microphone, then?

MR. ZELLER:

No. Simply to get your statement on the record, so if you'll state your name.

MS. THOMPSON:

I'm Sally Thompson, and I'm Chairperson of the Hillsborough Environmental Coalition, and I'd like to say, just for starters, that Gloria Rains pretty well covered most of our concerns.

On behalf of the Hillsborough Environmental Coalition, which is comprised of concerned individuals and organizations in the Tampa Bay area, such as the Audubon Society, Sierra Club, Save Our Bays, Citizens Against River Pollution, Gulfcoast Lung Association, and various other civic associations, I'd like to go on record expressing our concern with conservation measures and other alternatives that have not been addressed adequately in this DEIS.

You will be receiving written comments from the Coalition within the required time frame as well as comments from experts within our organization.

It is our hope that alternatives to power plants will be seriously considered in the future. Do we really need more power plants? Perhaps it will be concluded that additional power plants are not the answer, especially when we live in a county that has the dubious honor for having the worst air quality in Florida.

Because of our concerns for the quality of life in Hillsborough County, which is a microcosm of all the environmental problems and concerns in the state, such as growth, land use, air and water quality, energy, solid waste, etcetera, we must seriously pursue the avenues of conservation and other alternatives.

ST-1 With a year-round temperate climate, Hillsborough County could be a showplace. It seems a shame that EPA did not see fit to consider conservation as an appropriate management alternative for Big Bend 4.

We hope in the future that conservation and other alternatives to power plants will be strongly pursued.

Thank you.

MR. ZELLER:

Thank you, Ms. Thompson.

Next I'd like to ask for Mr. Richard T. Panel. Have I pronounced that right?

MR. PAUL:

Paul.

MR. ZELLER:

Paul; I'm sorry. Mr. Richard Paul from the Hillsborough Environmental Coalition.

MR. PAUL:

Thank you, Mr. Zeller.

I'm speaking tonight as the Water Quality Chair for the Hillsborough Environmental Coalition.

I'd like to mention a few specific problems rather

RP-1 than paint with a broad brush, and the first of these is acid rain, which I believe the Draft Environmental Impact Statement waves at but does not appropriately discuss. It's a problem emerging in the United States that's perhaps of some magnitude, and I think it should be treated that way in Florida as well.

We believe that much closer attention should be given to this problem and this particular issue, and I would like to add that proceeding on the assumption that there is no problem until there's some more information is unacceptable.

I'd like also to refer to the effects of thermal pollution on estuarine communities, particularly sea grass beds, and most particularly in the embayment area, a small triangular area to the south of the actual plant site.

RP-2 The embayment area -- excuse me -- the embayment area contains mangroves along the fringe and sea grass, aloe communities. The latter community has already been shown to be degraded as compared to a non-thermally-impacted control area nearby, and it can be expected to show further deterioration with the increased thermal discharge accompanying Unit No. 4.

No mention is made of this problem. A recent report documents an 80 percent loss of sea grass meadows in Hillsborough County. Any further loss will not be permitted.

In addition, thermal discharges have been shown to adversely affect mangroves and mangrove-associated fauna. Again, there's no mention in the DEIS.

RP-2

The whole question of the biological impact of thermal effluent being carried into the embayment by rising tides has apparently been ignored. It's our understanding that as part of the permitting process for the previous units at Big Bend, an agreement was reached that if the present sheet pile wall was determined to be too short to prevent thermal effluent from entering the embayment, causing damage, it would be modified or extended. We would appreciate a clarification on that point.

We believe the problem of thermal loading in the embayment requires further study, and if it is shown to be a problem, modifications of the discharge canal and/or sheet pile wall should be required.

RP-3

It's our -- excuse me -- it's our understanding also that ash and scrubber sludge storage areas present potential long-term toxicity problems from heavy-metals contamination. TECO should give assurances of their permanent commitment to maintain these sites in a manner that is safe, both environmentally and for public health.

RP-4

And lastly, we believe that as mitigation for other environmental effects, many of which have been mentioned already, fine-mesh screening should be considered on Units 1 and 2 as well. It may not be possible to require this of TECO, but I would hope that TECO, as a public-spirited organization, would consider the possibility.

Thank you.

MR. ZELLER:

Thank you, Mr. Paul.

Let me suggest --- We will, of course, respond to your comments formally. That's why we're here, and that's why we're putting them on record, but I think Mr. Hicks covered, Delbert Hicks, covered some of the aspects that you were talking about, and I'd like to suggest that you find an opportunity to meet with him after the hearing for a little further clarification. Thank you very much.

MR. PAUL:

Thank you very much.

MR. ZELLER:

Next I'd like to ask for Mr. Michael Kenney from the Hillsborough County Environmental Coalition. Mr. Kenney?

MR. KENNEY:

The Hillsborough Environmental Coalition is concerned about the air quality impact of the proposed project, because the Big Bend site is within close proximity to two non-attainment areas of the National and Florida Ambient Air Quality Standards; that is, the portion of Hillsborough County designated as a non-attainment area for suspended particulates and a portion of Pinellas County that is designated as a non-attainment for sulfur oxides.

A careful review of the Draft Environmental Impact

Statement of Big Bend Unit No. 4 indicates to us a need for a clarification of the following points with regard to air quality:

Item 1: The modeling for SO_2 shows that the resultant estimated three-hour concentrations will consume 84 percent of the National Ambient Air Quality Standards.

The modeling also shows that the impact on Pinellas County SO_2 non-attainment area will be 80 percent of the allowed applicable emission offsets for this facility.

These computer modeling estimates are based on the assumption that coal, the sulfur content, of three to six pounds per million BTU's will always be available.

MK-1

The Hillsborough Environmental Coalition is concerned that these SO_2 projections are very close to insulting the air quality standards and that they are formulated on a weak, non-realistic assumption, and that is that coal, sulfur coal, will always be available.

The Hillsborough Environmental Coalition feels that Tampa Electric Company must employ some SO_2 control technology to ensure that the air quality is kept at the prescribed health protection standards.

MK-2

With regard to particulate matter, total emission inventory for the new unit and associated facilities seems, in a word, excessive. The combined calculated particulate matter emission volumes are as follows, in terms of tons per year, and I'm taking this out of the EIS report:

MK-2 In the coal-handling facilities, uncontrolled emissions are estimated to be 900 tons per year. From controlled coal-handling facilities, estimates are 120 tons per year. From the boiler, an estimation of 568 tons per year was calculated. The sum of these three figures is 1,588 tons of particulates emitted per year from this facility.

This value of 1,588 tons of particulate matter released annually is not compatible with the Hillsborough County goals of cleaning up a non-attainment area that lies within a few meters of the site.

MK-3 I'd also like to refer to a table in the 1979 edition of environmental quality of the Hillsborough County Environmental Protection Commission. Table 2.2-1, entitled Emission Inventory 1979, stationary sources of air pollution, and their estimates for the current TECO Big Bend site -- that is the three units -- is 1,236.

In a nutshell, the projections for this new unit are exceeding the emissions projected emanating from the first three units that are already in operation.

MK-4 The modeling for particulate matter, as shown in Table 3-12 in the EIS report, indicate that the Big Bend unit, Units 1 through 4, with all interacting sources, will come within 85 percent of exceeding the twenty-four-hour TSP standards.

We feel that modeling for particulate matter of the entire facility should be redone or recalculated showing the MK-4 combined effects of the boiler, the coal-handling facilities, the fugitive dust generated from additional vehicles used at the facility.

In conclusion, if attempts are not made to remedy these proposed problems as identified above and the preservation of air quality in the Tampa Bay air shed is not pursued by the MI utility, the Hillsborough Environmental Coalition will solicit public support to ensure that these problems are properly addressed and corrected.

Thank you.

MR. ZELLER:

Thank you, Mr. Kenney. I appreciate your comments.

The next speaker is Laurie Macdonald Rask with the Tampa Bay Sierra Club.

Ms. Rask?

MS. RASK:

I'm Laurie Macdonald Rask, Chair of the Tampa Bay Sierra Club.

Tampa Bay Sierra Club is concerned over the lack of action and interest by utilities and governmental agencies in pursuing alternative energy sources.

LR- Innovative, effective long-term programs, which are based on conservation, direct fuel use, cogeneration, and solar and other renewable energy sources are economically and environmentally productive. LR-1 Such alternatives have been given little attention in the Big Bend 4 Environmental Impact Statement, and we fear that little attention will be given to these alternatives in our region's future.

Serious consideration of the alternatives would eliminate the need, if any, for Big Bend 4. As you're well aware, the general public is not technically knowledgeable with regard to power plant operations. Citizens expect the Environmental Protection Agency to pursue effective long-term solutions to energy needs which protect our environment.

At the same time, citizens desire financial stability. A positive environmental and economic solution can co-exist. There are real and viable alternatives to the present attitude of building expensive, environmentally-damaging coal-fired power plants.

We will be looking to TECO and our governmental agencies to seek these alternatives in the future.

Thank you.

MR. ZELLER:

Thank you very much.

The next speaker will be Julie Morris who's Vice Chairman of the Florida Sierra Club.

Ms. Morris?

MS. MORRIS:

My name is Julie Morris. I'm Vice Chairman of the

Florida Chapter of the Sierra Club. I reside in Sarasota, Florida.

JM-1

I'd like to start out by commending TECO for its plans to utilize both scrubbers and electrostatic precipitators to abate some of the air emissions that will be potential from the plant. I think TECO should also be commended for its planned use of fine-mesh screens to reduce the mortality of eggs and larvae of estuarine organisms in its cooling water.

I'd like to state that we support EPA's assessment that from a purely environmental viewpoint, Big Bend No. 4 should not be constructed, and we find very valuable the information provided by EPA about the heat loading and the benthic impacts of the Big Bend No. 4 plant.

JM-2

We would like to criticize EPA for taking what we see as an inadequate look at the conservation alternative in their Environmental Impact Statement on Big Bend No. 4.

Every time the conservation alternative or the question of need arises in this EIS, EPA has deferred to the determination made by the Florida Public Service Commission.

That determination states that when you look at the whole peninsula, there's no need for Big Bend No. 4, but when you look at just the TECO service area, need for another unit is evident.

Economic growth in the service area is identified as a decisive factor in this determination of need in the local

JM-2

area. We would encourage EPA to look beyond the PSC determination of need and also to look beyond the conservation goals of the Public Service Commission.

We believe that a great deal more can be achieved on the conservation front.

Taking a look at the TECO service area, we know that industrial users consume 23 percent more than residential users in the service area. This margin is declining, and by 1989 industrial users will only outstrip residential users by 10 percent.

JM-3

We're curious about what percent of the industrial use is used by the phosphate industry. We view industrial use of electricity by phosphate mining as imminently interruptable during peak load periods, and in fact we view slowing down strip mining for the purpose of lightening peak loads as being good for the biological resources and water resources of the region.

We also believe that phosphate mining in the region will probably be more short-lived than Big Bend No. 4 if current rates of phosphate extraction continue.

JM-4

Increased residential demands during the 1980's in the service area are expected, and the EIS details that Tampa Palms plans 13,497 units, and two U.S. Homes developments will total 8,500 units. These are both mentioned in Appendix G.

If winter peak loads are the primary reason for

JM-4

needing new capacity in the service area, why not make sure that the houses in these large new developments use non-electric heating systems. Electric baseboard heat is inefficient, and surely the cost of building Big Bend No. 4 is far greater than the cost of ensuring that all these new homes don't rely on electric heat.

We're convinced that conservation beyond the goal set by the Public Service Commission is achievable in the TECO service area and that investments in conservation are a better deal for TECO and for the air and water in the Tampa Bay region than investments in an additional unit at Big Bend.

JM-5

Another issue, we find confusing the various estimates of reserve capacity during the winter peak of 1985-86 contained in the EIS. Without Big Bend No. 4, we find reserve capacity estimated at 21.3 percent on page G-3, at 13 percent on page G-2, and at 9 percent on page I-4. We'd like some clarification on what the actual reserve capacity is supposed to be in that winter season.

JM-6

Finally, the attractiveness of adding a coal unit to the Florida Power generation system to displace oil generation appears to have been considered heavily as a balancing factor to the local environmental impacts of Big Bend No. 4.

We find that this argument has been used consistently when the environmental impacts are mentioned in the summary sections of the report as a balancing factor.

It is our opinion that conservation is a better alternative than building Big Bend Unit 4 at this time.

Thank you.

MR. ZELLER:

Thank you, Ms. Morris.

Next I'd like to ask Mr. Barney Capehart, Chairman of the Power Plant Siting Group with the Sierra Club.

Mr. Capehart?

MR. CAPEHART:

(Presenting)

MR. ZELLER:

Thank you.

MR. CAPEHART:

Mr. Zeller, Mr. Oven. My name is Barney Capehart. I represent the Florida Chapter of the Sierra Club in my position as Chairman of the Power Plant Siting Committee.

The Florida Chapter of the Sierra Club is greatly concerned about the economic and environmental effects of Florida's move to build coal-fired power plants.

Several recent studies, some of those done by the federal government, some of those done by Florida institutions and universities, have identified a series of problems associated with coal-fired power plants in general and in our state in particular.

Some of these problems have already been addressed --

problems of air pollution, water pollution, coal ash disposal, scrubber sludge disposal, radioactivity, visibility reduction, acid rain, coal transportation hazards.

One of our concerns now rests with the current attempts to modify the Clean Air Act. Presently, power plants are required to meet the Best Available Control Technology.

Under proposed amendments to the Clean Air Act, this would no longer be a necessary condition, and it's possible that the Tampa area, which already enjoys some of the worst air in the State of Florida, could be facing the operation of a coal-fired power plant without scrubbers under these revisions to the Clean Air Act.

That's a significant change in air standards and would have a significant effect on the people of Tampa.

The major concern of the Sierra Club is that we recognize the need for energy services, we recognize the need to reduce dependence on oil; but building coal-fired power plants is not the only solution to these problems, and it certainly isn't the best solution to these problems.

Other alternatives are available which are undeniably cheaper, don't have the environmental degradations, and displace as much oil as if coal-fired power plants were used.

The State of Florida relies heavily on its image of clean air and clean water to attract tourists, new residents and industry.

We can't afford to foul our own environment with a poorly-justified policy to burn greater amounts of coal.

BC-1

Some of the alternatives that are available to burning coal involve use of coal-oil mixtures, increased supplies of natural gas, direct use of oil and gas, conservation through approved energy efficiency of end use, use of cogeneration, use of solar and renewable energy sources.

The Florida Chapter of the Sierra Club has expressed its concern on numerous occasions to the EPA. We have specifically requested in the past that EPA consider alternatives to this coal-fired power plant.

BC-2

In particular, we requested that conservation and renewable sources be one of the alternative studies in the EIS, that the conservation/renewable alternative receive consideration and equal study to any other alternative, and that the EPA use a model, known as the EDF or Environmental Defense Fund Willey model, previously endorsed by EPA in other power plant sitings, to investigate the alternative and impact of these policies.

The Draft Environmental Impact Statement does not address these concerns. Conservation alternatives are dismissed in a very small paragraph. The Draft EIS discussion of conservation relies basically on the conclusion of the Florida Public Service Commission that conservation was not a viable alternative to Big Bend 4. This conclusion is erroneous. The Florida Public

Service Commission never conducted any investigation to answer the question as to whether conservation or some other alternative could replace Big Bend 4.

The analysis that was conducted by the Florida Public Service Commission looked at the goals under the Florida Electrical Energy Conservation Act, known as FECA, and concluded that if the goals of FECA were met, then this plant was not needed on a state-wide basis and was only marginally needed in the TECO service area.

BC-2 But the FECA goals do not represent by any means the magnitude of the potential for conservation and alternative programs. The FECA goals represent a cosmetic approach; that is commendable, because it puts the State of Florida in a posture of adopting conservation, but the magnitude of those goals is so far below the potential available that it does not represent a logical conclusion that conservation was investigated as an alternative to building this coal-fired power plant.

Conservation plans submitted by TECO, as well as other utilities in the state, have shown large numbers of cost-effective programs involving conservation, cogeneration, renewable energy sources that are presently available, cost-effective, less-environmentally damaging, and could be pursued in replacement of the need for a coal-fired power plant.

I think there's significant expectation that the EPA lived up to its responsibility under the law to see that this study of alternatives was performed, that the results would be the same for the Big Bend 4 plant as it was for a project known as the Allen-Warner Valley complex, presently perceived by the State of California. This project was investigated using this EDF Willey model. The results were that conservation, co-generation, and alternative sources, renewables, provided a cheaper, more cost-effective way to meet the energy needs without building the large coal-fired complex in the Allen-Warner Valley.

BC-2 Since the TECO Big Bend 4 plant is small compared to the overall capacity of the system, there's every reason to believe that the output of that plant could be replaced by these alternative sources.

The failure of EPA to pursue such a study in the TECO case appears indicative of EPA's new role in favoring industrial expansion requests regardless of the physical and economic cost to the consumer.

Numerous conservation alternative programs are possible. In an attachment to my prepared statement, I have looked at one of the countless programs that could be put down on paper where the output of the TECO Big Bend 4 plant could be supplanted by any number of conservation, solar, renewable, cogeneration programs.

This one is strictly related to the residential sector. It looks at a program involved with replacing refrigerators by high-efficiency models, replacing resistance water heaters with gas water heaters, replacing strip electric heaters with gas heaters, replacing central and window air conditioners by high-efficiency models available on the market.

This particular plan for the 300,000 TECO residential customers would result in eliminating the need for the entire output of the Big Bend 4 plant.

BC-2

This, then, is proof that there is a conservation alternative to the Big Bend 4 plant. Such an alternative was not studied. It does not appear in the EIS, and because of that, the Sierra Club declares the Environmental Impact Statement to be inadequate under the law, and that in order to comply with the provisions of NEPA that such an analysis of these kinds of alternatives must be performed before this plant can be approved.

Part of these conservation alternatives involve changing customers' consumptions and things that they use, and although utilities frequently allege that they have no control over customers' efficiency decisions, the truth is that innovative programs can indeed influence appliance marketing strategies, as witnessed when the utilities promoted electric appliances in all-electric homes.

Furthermore, the policy of having private industry promote social policies, rather than the government, appears to be the cornerstone of President Reagan's philosophy. Thus, if EPA studies these alternatives and proves that conservation is a more cost-effective alternative, then TECO would have the opportunity to embrace President Reagan's economic philosophy wholeheartedly.

The very purpose of having a requirement for an evaluation of alternatives for new coal-fired power plants in the EIS is to aid in identifying options that are cleaner, cheaper, and better for the citizens involved.

BC-2

The EPA has not only failed in its legal obligation to provide a thorough analysis of alternatives, but it's also failed the vast majority of Florida citizens who want clean air, clean water, and the least expensive approach to satisfying our energy service needs, not our electric needs, but our energy service needs.

The EIS concludes with a statement on these alternatives that the Commission -- meaning the Florida Public Service Commission -- concluded that if its conservation goals are achieved, Big Bend 4 may not be needed from the standpoint of the peninsular system's capacity.

However, the Commission also concluded that it appears that the proposed unit is needed for TECO's system, whether or not TECO achieves the conservation goals allocated to it.

Accordingly, conservation was not considered to be an appropriate management alternative. This conclusion represents an abrogation of the responsibility of the EPA to see that a thorough analysis of alternatives was conducted. Again, the PSC analysis looked at the Florida Energy Efficiency Conservation Act goals, made a conclusion with respect to those.

It did not, absolutely did not analyze conservation and alternatives under the condition that they might totally replace the TECO Big Bend 4 plant.

The Draft EIS is clearly inadequate, and a thorough study of these alternatives must be performed in order for EPA to meet its legal obligation required under NEPA.

BC-2

NEPA is very clear in saying what is required. The CEQ guidelines, which are to have been the implementing regulations for what is to be done under NEPA, state very clearly that alternatives are to be included and represent the very heart of an Environmental Impact Statement. It says that agency shall rigorously explore and objectively evaluate all reasonable alternatives, shall include reasonable alternatives not within the jurisdiction of the NEPA agency.

The CEQ regulations emphasize the identification and analysis of real alternatives and stress that the environmental impact analysis is to concentrate on alternatives, the heart of the process.

In particular, the CEQ comments on regulations emphasized that the examination of alternatives is a requirement that is firmly established in the case law interpreting NEPA.

In addition, another section of the CEQ regulations specify particularly that with regard to energy facilities that energy requirements and conservation potential of various alternatives and mitigation measures must be examined.

These requirements are clear, that EPA has a legal responsibility to identify and study all viable alternatives.

The Calvert Cliffs decision, a legal case involving the Atomic Energy Commission, was a case that made clear that alternatives had to be evaluated under the NEPA law.

BC-2

EPA has also established a precedent in the case of the Allen-Warner Valley complex in California where a study performed by the Environmental Defense Fund was wholeheartedly endorsed by EPA, and the result was that that complex was denied the necessary permits, therefore resulting in the cancellation of that project, again because alternatives were shown to be cleaner, cheaper, and preferable.

Here in our own state we also have a good show by EPA; in the case of the Jacksonville Electric Authority plants currently being proposed, EPA is conducting an independent investigation of alternatives. This investigation is not being performed for the TECO plant. The reason for that I do not understand. It is clearly required under the law, and as far as the Sierra Club is concerned, we believe that the Environmental Impact Statement is inadequate until this has been corrected.

JEA, unlike TECO, is a 100 percent oil-fired utility. It, therefore, has even more reason to consider the need for coal-fired capacity. TECO has substantial coal, and there's little reason to feel that additional coal-fired capacity is needed.

BC-2 The Sierra Club reiterates its formal request that EPA adhere to the requirements of the law in formulating the final Environmental Impact Statement for the TECO Big Bend 4 plant.

Following minimum legal requirements should be standard EPA agency procedure and should not require legal battles from citizen groups to ensure compliance with the law.

Thank you.

MR. ZELLER:

Your comments are duly noted. May I ask if --- I have heard several other speakers address this need for power and conservation issue, and EPA, I think -- whether erroneously or not -- normally assumes that these are types of issues that are brought before state public service commissions, and this body is generally recognized as the body that has the responsibility.

I would just --- I'm inquiring here. I presume you have made these same comments to the Public Service Commission in the hearings that were held and -- the site certification hearings with the State, or have you? I guess that would be --

MR. CAPEHART:

No, I did not --

MR. ZELLER:

-- my question.

MR. CAPEHART:

-- make those same comments in that particular forum. I have made those comments to the State Public Service Commission in general before. It is the policy of our Public Service Commission not to investigate alternatives in detail. That's unfortunate. That's also an abrogation of their duty, but nonetheless such a study has never been performed. There is no such study available that anyone can point to.

Various conservation measures were looked at to some extent, but there was never a program to the extent that I've described where conservation potential has been investigated.

There is no doubt that the utilities, including TECO, have a responsibility now, under our FECA Act, to pursue energy conservation programs, and some of these things that I mentioned are being done, but they're being done on a very small scale, and they do not represent by any means the totality of the potential.

That's only for the residential sector also that I've worked out there, which represents 35 percent of TECO's load. If you can completely eliminate the need for that power

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plant by only looking at a program that addresses 25 percent of the load, what can you do when you look at cogeneration and look at commercial reductions due to the same energy-efficiency programs, so there's no question that there's a tremendous potential for conservation there.

The idea of investigating the cost-effectiveness of these alternatives is impossible, because the alternatives are not identified. They're not even specified. So you can't follow through on a requirement that these be evaluated. I can't look at the EIS, nor can any other interested person look into it, and try to understand the cost-effectiveness evaluation, because there isn't one. There is no program identified that would lead them to a subsequent cost-effectiveness analysis.

So the fact that the Public Service Commission did not do this, I don't believe relieves EPA by any means; nor do I believe that the case law supports that, and I believe EPA is bound under the law to make sure that this is done.

If the PSC didn't do it, then somebody has to do it, and EPA has the whole force, the complete force, of the law behind it in requiring that analysis to be performed and be included in the EIS before the approval process is granted.

MR. ZELLER:

Well, clearly, EPA will respond to the extent that we're required to respond under the statutes that we operate under. We have no problem with that, and, of course, as you

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pointed out, NEPA does require an assessment of alternatives. To the extent that should be carried out, I cannot make a judgment at this time. You've asked for a very comprehensive evaluation of alternatives which may or may not be appropriate, but I appreciate your comments. They've very --- They've very well-done, and they're very thought-provoking.

Do you have anything, Mr. Oven?

MR. OVEN:

No.

MR. CAPEHART:

Thank you, Mr. Zeller.

MR. ZELLER:

Is there anyone else who would like to make --- That's all the cards that I have. Is there anyone else in the audience who has registered and indicated they wish to make a statement who would like to do so at this time?

(No response)

If not, we'll proceed to formally close out the hearing. One more time; is there anyone who would like to make a statement?

(No response)

Let me thank you who did make presentations tonight and others who have attended this hearing. I appreciate your cooperation and the thought and extent that went into your statements.

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The record of the hearing and the comment period will remain open through the close of business on September 2nd, 1981. This will allow anyone wishing to submit additional statements sufficient time to do so.

Further submissions to be included in the official record must be in writing, and they should be sent to John E. Hagan. That address is given at the bottom of the agenda that was handed out to you.

Although the customary procedure prohibits construction prior to the final issuance of an NPDES permit for new sources, EPA and the Tampa Electric Company had been negotiating an agreement, which is provided for in the regulations, whereby the company may commence construction at an earlier time.

The company would have to agree to comply with all EIS-related NPDES permit conditions, and only construction activities of a reversible nature would be allowed.

Technically, this agreement has not been finalized pending comments at this hearing which may affect the conditions imposed by the EIS.

Now, after consideration of all the written comments and of the requirements and policies of the Act and appropriate regulations, the EPA Regional Administrator will make determinations regarding permit issuance.

If the determinations are substantially unchanged, the EPA Regional Administrator will so notify all persons

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making oral statements tonight and all persons submitting written comments.

If the determinations are substantially changed, the EPA Regional Administrator will issue a public notice indicating the revised determination.

Now, within thirty days of receipt of the final determination or the date of the public notice, any interested party may request an evidentiary hearing on this determination.

A request for an evidentiary hearing should be addressed to the EPA Regional Hearing Clerk. The procedures for filling out evidentiary hearing requests are set out in Title 40, Code of Federal Regulations, Part 124, Subpart E, of Volume 45 of the Federal Register on page 33498, which was published on May 19, 1980.

Please note that any issues posed by an evidentiary hearing request must have previously been raised by the requester during the public comment period or at the public hearing.

Unless the request for an evidentiary hearing is granted, our determination will be the final action of the EPA. Pending final agency action on an evidentiary hearing concerning Unit 4, which is granted by the Regional Administrator, the applicant will be without a permit as the project for which the permit has been applied for is a new source.

For any hearings on Units 1 through 3, only the contested provisions of the permit will be stayed.

The record upon which the determination to issue is made will include both comments received at this hearing and received in response to the public notice.

The final permit will be issued no sooner than thirty days after issuance of the final Environmental Impact Statement, pursuant to 40 CFR 124.61.

We thank all of you again for attending here tonight and participating in this public hearing.

If there's no further comments, I'll consider the hearing now closed.

(Whereupon, at 9:12 p.m. the hearing was closed)

CERTIFICATE

This is to certify that the attached proceedings before

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY and
THE FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Recreation Center
901 6th Street
Ruskin, Florida

7:30 p.m.

August 19, 1981

were held as herein appears and that this is the official transcript of the proceedings for the file of the Agency.

ANNE JAPOUR
Certified Verbatim Reporter
Official Reporter

RESPONSES TO TRANSCRIPT COMMENTS

RESPONSE TECO-1

See response to written comment TECO-13.

RESPONSE TECO-2

See response to written comment TECO-14.

RESPONSE TECO-3

See response to written comment TECO-15.

RESPONSE GCR-1

See response to written comment SC-7.

RESPONSE GCR-2

Comment acknowledged.

RESPONSE GCR-3

Testimony presented during the Big Bend 4 Need Certification hearing before the Florida Public Service Commission, addressed the adequacy of TECO's present and projected generating capability. On Pages 5 and 6 of the testimony, the winter of 1985/1986 is examined and Big Bend 4 is found to be necessary to meet reasonable system reserve margins. The Florida Public Service Commission has certified the need for Big Bend Unit 4.

> The total projected TECO system capability in the winter of 1985/1986 without Big Bend Unit 4 is 2522 MW and the forecasted firm load (with conservation) at that time is 2225 MW. This equates to a system reserve margin of 13% and results in a high probability that the load could not be served when planned maintenance and forced outages are taken into account. The forecasted total load, including interruptible for the winter of 1985/1986 is 2517 MW leaving essentially no reserve when firm load and interruptible load are combined. While TECO bases its need for additional generation on the analysis of firm load requirements, it is reasonable to expect that interruptible customers will abandon that class of service and move to a firm rate if interruptions become excessive. Such a move would only exacerbate the problem and increase the need for additional capacity.

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TECO performed an economic analysis of the impact of Big Bend 4 that shows the unit will actually result in savings to the customer because of the choice of coal fuel over oil. This is because a larger portion of the energy generated for firm load will come from coal instead of oil. The following tables presented at the Big Bend 4 Need Certification Hearing contain details of this analysis.

RESPONSE GCR-4

The present yard grade elevation at Big Bend Station is 8.5 feet mean low water datum. Accordingly, flooding at the site will occur only under extreme storm conditions. To assure that material placed in the ash disposal sites will not be affected by possible flooding, TECO has stated that they will be designed and operated in accordance with Resource Conservation and Recovery Act (RCRA) restrictions for construction of solid waste disposal sites in flood plains (44 FR, 4356; September 13, 1979, "Criteria for Classification of Solid Waste Disposal Facilities and Practices").

RESPONSE GCR-5

The Hillsborough and Pinellas nonattainment areas will receive impact from the proposed coal-fired unit. However, the dispersion of these pollutants limits their predicted impacts to below the regulatory significance levels (1 g/m^3 annual, 5 g/m^3 24-hr, and 25 g/m^3 3-hr). Therefore, there exists no basis whereby the Environmental Protection Agency can prohibit the unit's construction or request a lowering of emissions. Increases in NO_x ambient concentrations are predicted to be 0.5 g/m^3 maximum, and are also less than the significant level of 1 g/m^3 on an annual basis.

The air quality dispersion analysis demonstrates that this unit's operation will not affect air quality in these nonattainment areas with any degree of severity.

RESPONSE GCR-6

EPA concurs in the technical propriety of the variance from metal criteria for surface discharges. EPA believes there will be no significant impact on ambient water quality in Tampa Bay as a result of the variance.

RESPONSE GCR-7

EPA recognizes that leachates may be generated from storage areas and ponds associated with the Big Bend complex. For this reason the NPDES permit has been conditioned to require implementation of a groundwater monitoring program. If monitoring reports indicate contamination of the groundwater is evident, corrective measures will be pursued to mitigate the contamination.

DOCKET NO. 800595-EU
TAMPA ELECTRIC COMPANY
WITNESS: H. A. TURNER
EXHIBIT ____ (HAT-1)
DOCUMENT 1
PAGE 1 of 1

TAMPA ELECTRIC COMPANY
GENERATION EXPANSION PLAN

			Without Purchase						With Purchase				
			System	Total		Firm			System	Total		Firm	
Year	Capacity Addition	Sale	Capability (Annual Peak)	Load	% Reserve	Load	% Reserve	Purch.*	Capability (Annual Peak)	Load	% Reserve	Load	% Reserve
1980/81			2475	2152	15	1949	27		2475	2152	15	1949	27
1981/82			2477	2314	7	2036	22	150	2627	2314	14	2036	29
1982/83			2522	2372	6	2094	20	250	2772	2372	17	2094	32
1983/84			2522	2424	4	2134	18	250	2772	2424	19	2134	30
1984/85			2522	2470	2	2185	15	200	2722	2470	10	2185	25
1985/86	Big Bend #4 417 MW - Coal	208	2731	2517	9	2225	23	200	2931	2517	16	2225	32
1986/87		104	2835	2568	10	2274	25	100	2935	2568	14	2274	29
1987/88			2939	2625	12	2331	26	100	3039	2625	16	2331	30
1988/89			2939	2686	9	2392	23	100	3039	2686	13	2392	27
1989/90	MacInnes #1** 800 MW - Coal	400	3339	2744	22	2454	36		3339	2744	22	2454	36

* Short-term purchases of peaking capacity are contemplated.

** TECO plans to own 400 MW of the 800 MW MacInnes Unit 1. In addition, a short-term unit power contract is anticipated similar to Big Bend Unit 4, which will reduce the 1989/90 percent reserve.

ECONOMIC IMPACT OF BIG BEND #4 IN 1985
100% OIL DISPLACEMENT AT PROJECTED FUEL ESCALATION RATES[1]

Year	Fuel Price (¢/MBTU) Oil	Fuel Price (¢/MBTU) Coal	Fuel Price (¢/MBTU) Δ	Fuel Cost Savings $/MWH	Fuel Cost Savings M$/Yr.	Non-Levelized Annual Fixed Charges (M$)	Cost of Capital During Construction	Total Annual Savings (M$)	Total Annual Savings Present Worth (M$)[2]	Total Annual Savings Cumul. Present Worth (M$)[3]
1980							3	(3)	(3)	(3)
1981							4	(4)	(4)	(7)
1982							10	(10)	(8)	(15)
1983							22	(22)	(16)	(31)
1984							34	(34)	(23)	(54)
1985	623	286	337	35	62	90	10	(38)	(23)	(77)
1986	710	312	398	42	100	105		(5)	(3)	(80)
1987	810	340	470	49	116	100		16	8	(72)
1988	923	371	552	58	138	95		43	20	(52)
1989	1053	404	649	68	161	90		61	25	(27)
1990	1200	440	760	80	190	86		104	39	12
1991	1344	480	864	91	216	81		135	46	58
1992	1505	523	982	103	245	77		168	52	110
1993	1686	570	1116	117	278	73		205	58	168
1994	1888	621	1267	133	316	69		247	63	231
1995	2115	677	1438	151	359	65		294	68	299
1996	2369	738	1631	171	406	62		344	72	371
1997	2653	804	1849	194	461	58		403	77	448
1998	2972	877	2095	220	522	55		467	81	529
1999	3329	956	2373	249	591	52		539	84	613
2000	3727	1042	2685	282	670	49		621	88	701
2001	4174	1135	3039	319	757	46		711	92	793
2002	4675	1238	3437	361	857	44		813	95	888
2003	5236	1349	3887	408	969	42		927	98	986
2004	5864	1470	4394	461	1095	39		1056	102	1088
2005	6568	1603	4965	521	1237	37		1200	105	1193
2006	7356	1747	5609	589	1399	36		1363	108	1301
2007	8239	1904	6335	665	1579	34		1545	111	1412
2008	9228	2076	7152	751	1783	32		1751	114	1526
2009	10335	2262	8073	848	2013	31		1982	117	1643
2010	11575	2466	9109	956	2270	30		2240	120	1763
								17119		

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[1] **Escalations**

Coal - Year by Year Escalation Through 1984; 9% Thereafter.
Oil - Year by Year Escalation Through 1984; 14% (1985-1990); 12% Thereafter.

[2] Present Worth Discount Rate is 10.25%.

[3] January 1, 1981 Dollars.

RESPONSE GCR-8

Based on a new trend in utility flue gas desulfurization (FGD) practice, commercial grade gypsum manufacture by forced-oxidation operation of the limestone-base wet FGD is now becoming common. This is the first commercial by-product FGD process alternative that is economically feasible for many U.S. utilities.

In the 1970s, extensive application of such systems began in Japan. These systems produce commercially marketable coarse-grained by-product chemical gypsum in lieu of waste calcium sulfite sludge. This gypsum has been successfully used in full scale production of wallboard, Portland cement, and as an agricultural additive.

The Chiyoda CT-121 process, pilot-tested at Gulf Power Company's Plant Scholz, successfully produced commercial grade gypsum. Part of this gypsum was used in the production of wallboard at National Gypsum Company's Gold Bond Building Products plant in Tampa, Florida, during September 1979. Approximately 1000 full-size boards were produced. The wallboard met or exceeded all specifications and was sent out for normal distribution into the building industry.

Research-Cottrell, the manufacturer of the Big Bend Unit 4 FGD system, has formed a company with Gebr. Knauf of Germany, a major producer of gypsum products. FGD systems in Germany are at this time producing gypsum that is being manufactured into commercial wallboard. U.S. Gypsum and Celotex are actively pursuing the use of FGD by-product gypsum in this country. Several utilities are presently considering retrofitting the equipment required for producing gypsum.

The Big Bend Unit 4 FGD system is designed to produce gypsum meeting Gold Bond's specifications. While no contracts have been signed, Gold Bond has stated that it can utilize as much gypsum as Tampa Electric can supply. Gold Bond presently must import natural (impure) rock gypsum from Nova Scotia.

Tampa Electric Company presently sells its flyash to Florida Flyash, a subsidiary of Florida Mining and Materials. This flyash is used in the production of Portland cement, concrete, and masonry products. Flyash is a usable by-product.

RESPONSE GCR-9

The gypsum and flyash are proposed to be marketed (see response to transcript comment GCR-8 above). If flyash is disposed onsite it will be so in lined disposal ponds. Although preliminary information indicates the leaching potential of gypsum (if stored onsite) and bottom ash is minimal, a groundwater monitoring program for the purpose of detecting leachate contaminates is a condition of the NPDES permit. See also the response to transcript comment GCR-7.

RESPONSE GCR-10

The final draft NPDES permit will reflect the final determinations by the State of Florida and EPA relative to variances for Units 1-3 and 4. EPA Region IV does not expect that regulations will be promulgated under the stated sections of the Act which will be more stringent than those already promulgated (October 8, 1974) or proposed (October 14, 1980). These requirements are included in the draft NPDES permit. However, to assure that proper controls are exercised in the event that this expectation is incorrect, the reopener clause has been included. See also the response to transcript comment GCR-6 above.

RESPONSE GCR-11

See response to transcript comment GCR-6.

RESPONSE GCR-12

The DEIS reports the fact that the addition of Unit 4 to the Big Bend Station will result in an expanded area of thermal impact to the benthic biota of Hillsborough Bay. The increased thermal load is expected to enlarge the area of adverse impact from about 46ha (115a) to 61ha (152a). The additional impacts expected, however, are not viewed as unacceptable for reasons indicated in EPA's tentative findings of fact and determinations reported in Appendix D of the DEIS.

RESPONSE GCR-13

The DEIS recognizes that fine-mesh screening is a relatively new intake technology and that it has the potential to reduce entrainment effects associated with once-through cooling systems. The potential use of such technology was demonstrated by the applicant through a lengthy series of testing and modifications to a prototype fine-mesh screening device. For example, the DEIS reports that the screening device was 56 percent effective in removing eggs and larvae of fish and shellfish from the cooling water source. Since this finding, engineering changes in the screening device have provided for an increased screening efficiency. With the installation of full-scale fine-mesh screening structures on Units 3 and 4, the operational success of the two installations will be monitored and assessed. Requirements for such testing and assessments are indicated in Part III of the Draft NPDES Permit reported in Appendix A of the DEIS.

The level of entrainment associated with any conventional generating units is primarily a function of the volume of cooling water required. As stated in the DEIS, each of the four generating units at the Big Bend Station will require approximately 537 cfs cooling water flow. Hence, each unit would be expected to effect the same level of entrainment impact.

RESPONSE GCR-14

See response to written comment HEC-4.

RESPONSE GCR-15

Comment noted. This comment appears to summarize the commentor's presentation. Attention is directed to the responses previously given for specific issue areas.

RESPONSE GCR-16

See response to transcript comment GCR-10.

RESPONSE ST-1

See response to written comment SC-7.

RESPONSE RP-1

See response to written comment HEC-4.

RESPONSE RP-2

See response to written comment CDC-3 and HEC-5.

RESPONSE RP-3

See response to written comment HEC-6.

RESPONSE RP-4

See response to transcript comment GCR-13.

RESPONSE MK-1

See response to written comment HEC-2.

RESPONSE MK-2

See response to written comment HEC-3.

RESPONSE MK-3

See response to written comment HEC-3.

RESPONSE MK-4

See response to written comment HEC-3.

RESPONSE MK-5

Comment noted.

RESPONSE LR-1

See response to written comment SC-7.

RESPONSE JM-1

Comment noted.

RESPONSE JM-2

See response to written comment SC-7.

RESPONSE JM-3

In 1980, total sales of energy by TECO to industrial customers amounted to 4,290 GWH. Sales to phosphate customers accounted for 3,276 GWH, or about 76 percent of that total.

RESPONSE JM-4

Comment noted. See also response to written comment SC-7.

RESPONSE JM-5

The various reserve percentages referenced in this comment can be explained with the aid of the tables included as part of response to transcript comment GCR-3 above. These tables are Exhibit HAT-1 to Mr. H. A. Turner's prepared written testimony submitted to the Florida Public Service Commission at the Big Bend 4 Need Certification hearing.

In the winter of 1985/1986, forecasted firm load is 2,225 MW and forecasted total load is 2517 MW (total load equals firm load plus interruptible load). System capability is 2,522 MW (without Big Bend 4) and 2,731 MW (with Big Bend 4. Note: TECO will retain 209 MW of 417 MW from Unit 4 at this time).

Thus, without Big Bend 4, percent reserves for firm load are 13% (2,522/2,225). With Unit 4, percent reserves for firm load are 23% (2,731/2,225); and for total load are 9% (2,731/2,517).

RESPONSE JM-6

See response to written comment SC-7.

RESPONSE BC-1

Comment acknowledged. Energy alternatives were discussed in the DEIS (Section 2.3) and TRD (Section 3.2).

RESPONSE BC-2

See response to written comment SC-7.

Chapter 5
LIST OF PREPARERS

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William Greenaway	Chemical Engineering (BS) Wastewater Engineering

For information on the material presented in this section, contact Dario J. Dal Santo at (404) 881-7458 (FTS/257-7458).

Chapter 6
COORDINATION LIST

The following Federal, State, and local agencies and interest groups have been requested to comment on this impact statement:

Federal Agencies

Coast Guard
Corps of Engineers
Council on Environmental Quality
Department of Agriculture
Department of Commerce
Department of Education
Department of Energy
Department of Health and Human Services
Department of Housing and Urban Development
Department of the Interior
Department of Transportation
Economic Development Administration
Federal Aviation Administration
Federal Highway Administration
Fish and Wildlife Service
Food and Drug Administration
Forest Service
Geological Survey
Heritage Conservation and Recreation Services
National Park Service
Public Health Service
Soil Conservation Service

Members of Congress

Honorable Lawton Chiles
U.S. Senate
Honorable Sam M. Gibbons
U.S. House of Representatives
Honorable William McCollum
U.S. House of Representatives
Honorable Paula Hawkins
U.S. Senate
Honorable Andrew Ireland
U.S. House of Representatives
Honorable C. W. Young
U.S. House of Representatives

State Agencies

Honorable D. Robert Graham, Governor
Coastal Coordinating Council
Department of Agriculture
Department of Commerce
Department of Community Affairs
Department of Environmental Regulation
Department of Health and Rehabilitative Services
Department of Natural Resources
Department of the State
Department of Transportation
Geological Survey
Game and Freshwater Fish Commission

Local Agencies

Southwest Florida Water Management District
Tampa Bay Regional Planning Council
Southwest Florida Regional Planning Council
Greater Tampa Chamber of Commerce
Tampa Port Authority
City of Tampa
City of St. Petersburg
Hillsborough County Environmental Protection Commission

Interest Groups

Florida Audubon Society
Florida Sierra Club
Izaak Walton League of America
Florida Lung Association
ManaSota-88
Florida Defenders of the Environment
Florida Wildlife Federation
Hillsborough Environmental Coalition
League of Women Voters

Appendix A

NPDES PERMIT AND RATIONALE FOR BIG BEND UNIT 4

The draft NPDES permit for Unit 4 contained in this Appendix is designed for combination with the draft permit for Units 1-3 contained in Appendix B. This Appendix contains only those requirements which are specificially applicable to Unit 4, but does not include any of the "boilerplate" requirements of Section II which are included in Appendix B. Due to the different administrative procedures required for new sources (Unit 4) and existing sources (Units 1-3), separate applications were submitted and different NPDES Numbers assigned. However, only one permit will be issued for all four units after completion of the Environmental Impact Assessment procedures applicable to Unit 4. NOTE: Changes made to the July 9, 1981, Draft Permit contained in the DEIS (except for the November 20, Draft date) are indicated by a bar in the margin as shown to the right.

Permit No.: FL0037044

DRAFT

JAN 11 1982

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et. seq; the "Act"),

Tampa Electric Company
Post Office Box 111
Tampa, Florida 33601

is authorized to discharge from a facility located at

Big Bend Station
Unit 4
Big Bend Road
North Ruskin, Florida 33570

to receiving waters named

Hillsborough Bay

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof. The permit consists of this cover sheet, Part I 7 pages(s), Part II 12 page(s) and Part III 3 page(s).

This permit shall become effective on

This permit and the authorization to discharge shall expire at midnight, , 1987

Date Signed

DRAFT
JAN 11 1982

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee shall monitor outfall(s) serial number(s) 007 1/ - Plant Intake

Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow—m^3/Day (MGD)	Continuous	Pump Logs
Intake Temperature °C(°F)	6/day	Logs
Additional Monitoring	See Part III.E	

After the date of start of Unit 4 intake pump testing, intake screen wash water from Units 3 and 4 shall be discharged to the east end of the canal north of the intake canal or to a location acceptable to EPA and the State of Florida and may be discharged without limitations and monitoring requirements except for biological monitoring required by Part III.M. Any bypasses of the fine mesh screens shall be reported to EPA when submitting quarterly DMR's.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Plant Intake except that temperature shall be at the condenser inlet(s).

1/ This serial number is assigned for identification and monitoring purposes only, except as noted above for discharge of intake backwash.

DRAFT
JAN 11 1982

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through the term of this permit, the permittee is authorized to discharge from outfall(s) serial number(s) 008 - Once-through condenser cooling water from Unit 4 to the plant discharge canal.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements	
	kg/day (lbs/day)		Other Units (Specify)			
	Daily Avg	Daily Max	Daily Avg	Daily Max	Measurement Frequency	Sample Type

Note: There will be no changes to the once-through cooling water pages (I-1 and I-2) for Units 1, 2 and 3, except for the incusion of serial number "008" and Unit "4" at applicable points on those pages.

DRAFT
JAN 11 1982

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through the term of this permit, the permittee is authorized to discharge from outfall(s) serial number(s) 009 - Boiler blowdown from Unit 4 to Serial number 008.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements	
	kg/day (lbs/day)		Other Units (mg/1)			
	Daily Avg	Daily Max	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow—m^3/Day (MGD)	—	—	—	—	Daily	Daily Logs
Total Suspended Solids	4.9(10.8)	16.4(36.1)	30	100	2/month	Grab
Oil and Grease	2.5(5.4)	3.3(7.2)	15	20	2/month	Grab
Additional Monitoring	See Part III.E.				See Part III.E.	

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N /A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): nearest accessible point after final treatment but prior to mixing with other plant wastes.

DRAFT
JAN 1 1 1982

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through the term of this permit, the permittee is authorized to discharge from outfall(s) serial number(s) 010 - Bottom ash system blowdown to Serial number 008.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements	
	kg/day (lbs/day)		Other Units (mg/1)			
	Daily Avg	Daily Max	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow—m^3/Day (MGD)	—	—	—	—	Continuous	Recorder
Total Suspended Solids	13.0(28.8)	43.5(96.0)	30	100	2/week	Grab
Oil and Grease	6.5(14.4)	8.7(19.2)	15	20	2/month	Grab
Additional Monitoring		See Part III.E.			See Part III.E.	

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 2/week on a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): nearest accessible point after final treatment but prior to mixing with other plant wastes.

DRAFT
JAN 11 1982

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through the term of this permit, the permittee is authorized to discharge from outfall(s) serial number(s) 011 - Flue gas desulfurization system blowdown to Serial number 008.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements	
	kg/day (lbs/day)		Other Units (mg/1)			
	Daily Avg	Daily Max	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow—m^3/Day (MGD)	—	—	—	—	Continuous	Recorder
Total Suspended Solids	6.7(14.8)	22.3(49.2)	30	100	2/week	Grab
Oil and Grease	3.3(7.4)	4.5(9.8)	15	20	2/month	Grab
Additional Monitoring	See Part III.E.				See Part III,E.	

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 2/week on a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): nearest accessible point after final treatment but prior to mixing with other plant wastes.

DRAFT
JAN 11 1982

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the start of discharge and lasting through the term of this permit, the permittee is authorized to discharge from outfall(s) serial number(s) 012 and 013 - Construction dewatering waste discharge to plant intake and discharge canals, respectively.
Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations	Monitoring Requirements	
	Other Units (mg/l) Daily Max	Measurement Frequency	Sample Type
Total Suspended Solids	50	1/week	Grab

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):
Prior to discharge to canals.

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JAN 11 1982

B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

a. Achieve effluent limitations - On effective date or start of discharge as applicable.

f. Priority pollutant data (Part III.G.) - Submit by 12 months after commercial operation date of Unit 4 .

g. Flow report (Part III.H.) - Submit by 15 months after commercial operation date of Unit 4.

h. Groundwater Monitoring Program (Part III.I.)
    (1) Implement - One year prior to operation of Unit 4.
    (2) Reports - Quarterly with DMR's .

i. Erosion and Sediment Control Program (Part III.J.)
    (1) Implement - By start of on-site construction
    (2) Reports -
        (a) Quarterly with DMR's during first year.
        (b) Semiannually, thereafter.

j. Thermal Model (Part III.K.) - Verification six months prior to operation of Unit 4.

k. Installation of fine mesh screen (Part III.L.) - Prior to Unit 4 pump testing.

l. Biological Monitoring (Part III.M.) -
    (1) Submit study plan - 18 montns prior to commercial operation date of Unit 4.
    (2) Implement - one year prior to operation of Unit 4.

2. No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

DRAFT
JAN 11 1982

PART III

OTHER REQUIREMENTS

E. Additional monitoring of the plant intake (007), Unit 4 once-through cooling water discharge (008), boiler blowdown (009), bottom ash blowdown (010), and flue gas desulfurization system blowdown (011) shall be conducted at a frequency of 2/month for the first 12 months following commercial operation of Unit 4, and 1/month thereafter. Samples shall be two grab composites with grabs taken not less than two hours apart. Parameters shall include total arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium and zinc.

F. There shall be no discharge to waters of the United States of low volume wastes (except for FGD system blowdown (011) as otherwise provided herein); any water wash or chemical metal cleaning wastes; runoff from plant construction, coal pile(s), gypsum storage or disposal areas, fly ash storage or disposal areas (including that from rainfall events exceeding the 10-year, 24-hour storm); or fly ash sluice waters or blowdown.

G. Not more than 12 months after the Commercial Operation Date of Unit 4, permittee shall submit representative data as included in 40 CFR Part 122.53 (d)(7)(ii), (iii) and (iv) for serial numbers 007, 008, 009, 010, and 011. In the event than any pollutant is present at an unacceptable level, this permit shall be modified, or alternatively, revoked and reissued, to comply with any applicable provisions of the Clean Water Act. A twelve month period is to allow stabilization of waste streams before sampling.

H. Subsequent to the commercial operation date of Unit 4, the permittee shall conduct a detailed evaluation of inplant waste discharges (009, 010 and 011) to confirm design flow data. A report of this evaluation shall cover a one-year period after startup of the unit and shall be submitted not later than 15 months after the commercial operation date. In the event that actual flow data is significantly different from design data, the permit may be modified by the Director, Enforcement Division.

I. The Permittee shall implement a groundwater monitoring program approved by EPA and the State not later than one year prior to operation of Big Bend Unit 4. Monitoring shall be performed in accordance with the approved plan. Reports shall be submitted to EPA with quarterly Discharge Monitoring Reports.

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Should the reports demonstrate significant contamination of groundwater is occurring, the Permittee shall immediately consult with EPA and the State and expeditiously institute corrective measures acceptable to EPA and the State to mitigate the contamination. These measures may include but are not necessarily limited to: sealing, relocating, or altering operations of the wastewater treatment ponds, ash ponds, FGD byproduct/ash storage areas, or coal piles. If the reports demonstrate that no significant contamination is occurring from commercial operation of Unit 4, the Permittee after consultation with and approval by the Director, Enforcement Division, may reduce or eliminate the monitoring program.

In the event that changes in the monitoring program become necessary, such changes shall be approved by the Director, Enforcement Division, and the State Director prior to institution.

J. The Permittee shall implement a construction erosion and sedimentation control program approved by EPA not later than the start of onsite construction. Monitoring reports shall be submitted quarterly with the Discharge Monitoring Reports during the first year of construction and semiannually thereafter. Erosion and sedimentation control practices shall be consistent with sound engineering practices such as those contained in "Guidelines for Erosion and Sediment Control Planning and Implementation," EPA-R2-72-015 (August, 1972) or "Processes, Procedures, and Methods to Control Pollution Resulting from all Construction Activity," EPA-430-73-007 (October, 1973).

K. The Permittee shall validate the area to be impacted by the thermal plume from Units 1-4 by submitting a verified thermal dispersion model at least six months prior to commencement of operation at Unit 4. EPA, the State, and TECO shall agree to a program to ensure an appropriate model is selected, verified, and utilized.

L. The fine mesh screen for the Units 3 & 4 intake structures and the organism return mechanism shall be installed and operational prior to Unit 4 pump testing.

M. A biological monitoring program shall be implemented at least one year prior to operation of Unit 4. The program shall be designed so that the potential impacts of Unit 4, in conjunction with Units 1-3, on the benthos of the Tampa Bay system and the survivability of organisms during operation of the full-scale fine mesh screens and organism return mechanism can be assessed. The program shall be approved by EPA and the State and shall be conducted for one year following start of operation of Unit 4. A proposed program shall be submitted for EPA and State approval no later than 18 months prior to commercial operation of Unit 4 (currently scheduled for the spring of 1985).

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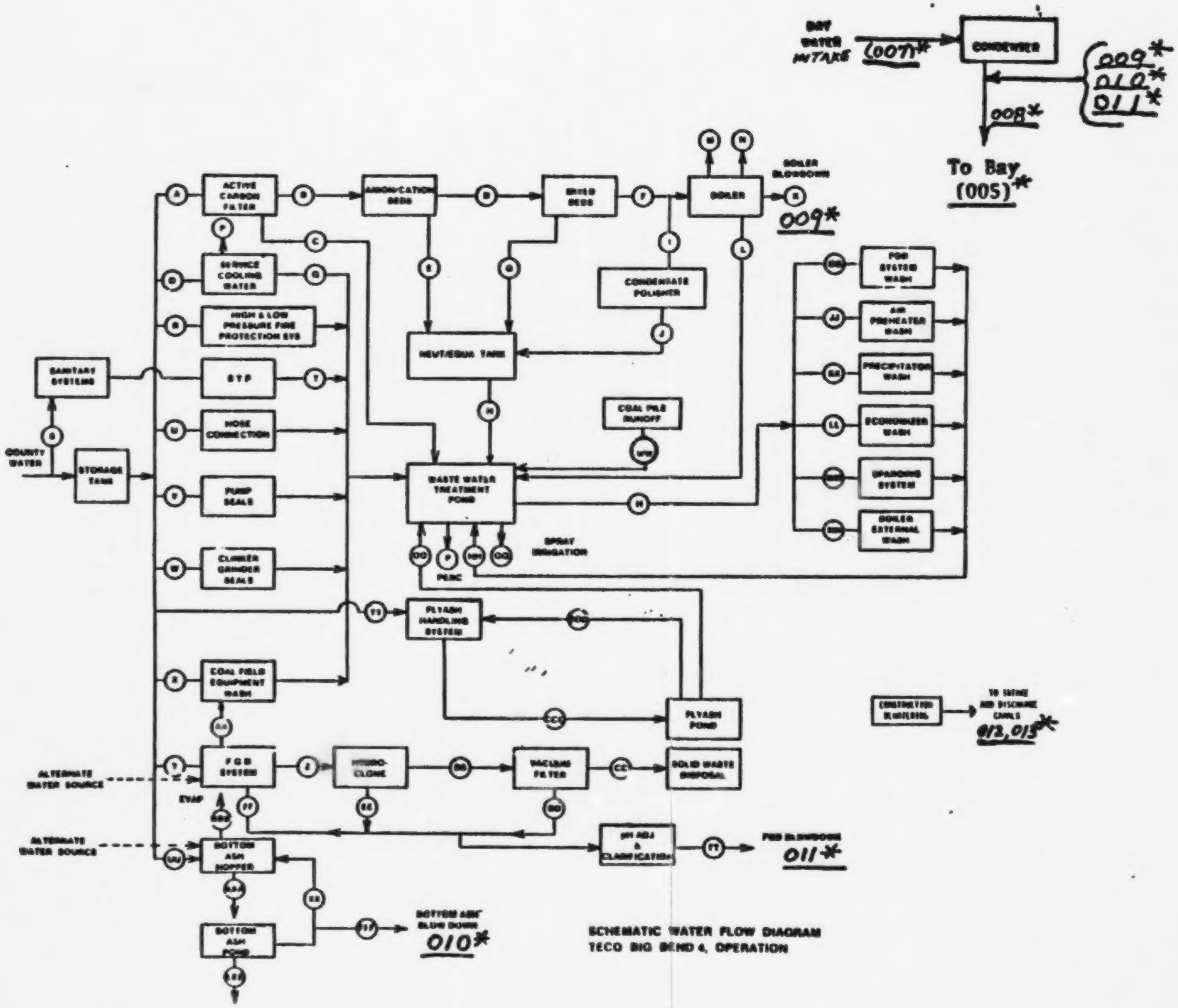
N. To alleviate potential adverse impacts to the West Indian manatee, an endangered species, the Permittee shall post "Slow Boat Speed" signs in the discharge canal and shall close the boat ramp in the discharge canal from November 15 to March 30 as recommended by the U. S. Fish and Wildlife Service (USFWS).

O. The Permittee shall ensure that the mangrove swamp system located along the southwestern coastal portion of the site is not disturbed as a result of construction and operation activities associated with the Big Bend complex.

P. Unless a preceding NPDES condition specifies otherwise, the Permittee shall implement its proposed project in complete accordance with the proposed action described in the Draft and Final EIS. This shall not preclude implementation of additional or more stringent conditions required by local or state governmental bodies. Should the applicant desire significant modification, such modification must be approved by EPA prior to initiation.

Q. The State of Florida Department of Environmental Regulation has certified the discharge(s) covered by this permit with conditions (Attachment B). Section 401 of the Act requires that conditions of certification shall become a condition of the permit. The monitoring and sampling shall be as indicated for those parameters included in the certification. Any effluent limits and any additional requirements specified in the attached state certification which are more stringent supersede any less stringent effluent limits provided herein. During any time period in which the more stringent state certification effluent limits are stayed or inoperable, the effluent limits provided herein shall be in effect and fully enforceable. (Note: Certification to be provided before permit issuance.)


BAY WATER INTAKE
(007)*
CONDENSER
009*
010*
011*
008*
To Bay
(005)*
COUNTY WATER
SANITARY SYSTEMS
STORAGE TANK
ACTIVE CARBON FILTER
SERVICE COOLING WATER
HIGH & LOW PRESSURE FIRE PROTECTION SYS
STP
HOSE CONNECTION
PUMP SEALS
CLINKER GRINDER SEALS
COAL FIELD EQUIPMENT WASH
FGD SYSTEM
BOTTOM ASH HOPPER
BOTTOM ASH POND
ANION/CATION BEDS
MIXED BEDS
BOILER
BOILER BLOWDOWN
009*
CONDENSATE POLISHER
NEUT/EQUA TANK
COAL PILE RUNOFF
WASTE WATER TREATMENT POND
SPRAY IRRIGATION
PERC
FGD SYSTEM WASH
AIR PREHEATER WASH
PRECIPITATOR WASH
ECONOMIZER WASH
SPARGING SYSTEM
BOILER EXTERNAL WASH
FLYASH HANDLING SYSTEM
FLYASH POND
HYDRO-CLONE
VACUUM FILTER
SOLID WASTE DISPOSAL
pH ADJ & CLARIFICATION
FGD BLOWDOWN
011*
BOTTOM ASH BLOW DOWN
010*
CONSTRUCTION DEWATERING
TO INTAKE AND DISCHARGE CANALS
012,013*
ALTERNATE WATER SOURCE
ALTERNATE WATER SOURCE
EVAP
A
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SCHEMATIC WATER FLOW DIAGRAM
TECO BIG BEND 4, OPERATION

*NPDES Serial Numbers

JAN 11 1982

Big Bend Station
Unit 4
Permit Rationale
NPDES No. FL0037044

I. Applicable Regulations

A. Federal performance standards for new sources for the steam electric power generating point source category (40 CFR 423.15) as promulgated on October 8, 1974, with proposed revisions published on October 10, 1980. (See Environmental Impact Statement (EIS) Appendix J.)

B. Florida Water Quality Standards ,Chapter 17-3, Florida Administrative Code. (See EIS Appendix K). The receiving water is classified as Class III - Recreation - Propagation and Management of Fish and Wildlife Surface Waters.

II. Effluent Limitations

A. NPDES Serial Number 008 - Once-through cooling water.

1. Temperature: A weekly average of 9.3°C(16.8°F) is included based on the 316(a) Determination, historical data from Units 1-3, and expected future operating levels.

2. Total residual oxidants (total residual chlorine): Limitation of 0.20 mg/l is based on Florida Water Quality Standards and is more stringent than the promulgated effluent standards (40 CFR 423.15(h)). Details of the rationale are included in the Environmental Impact Statement. A detailed chlorine minimization study is underway on Units 1-3. Future limitations consistent with proposed standards (40 CFR 423.15(g) through (i)) are included in the draft permit. Additionally, a decay study on oxidant concentrations in the discharge canal is required by the Permit. Subsequent to completion of these studies, Permit modification can be pursued should conditions require further reduction in total residual oxidant level.

B. NPDES Serial Number 009 - Boiler blowdown.

1. Limitations are as required by promulgated 40 CFR 423.15(g) and proposed 40 CFR 423.15(c), except that iron and copper limitations have not been included. Historical data from Units 1-3 indicate that iron and copper have been significantly below the 1.0 mg/l effluent requirement. A best professional judgement has been made that future concentrations of iron and copper from Unit 4 should be no greater than historical levels from Units 1-3. Additionally, proposed standards have deleted boiler blowdown as a separate category and have included it in the low volume waste category, 40 CFR 423.15(c), which is not subject to iron and copper limitations.

2. Additional monitoring requirements are included to assure conformance with applicable Water Quality Standards and with probable variance requirements (See item G, below).

C. NPDES Serial Number 010 - Bottom ash system blowdown.

1. Limitations are as required by promulgated 40 CFR 423.15(d) for a recycled ash handling system. Although proposed 40 CFR 423.15(e) would allow use of a once-through bottom ash transport system, such a system is not considered viable at the Big Bend Site for Unit 4 (adequate fresh water is not available and a salt water system is not environmentally desirable, based on data from the slag pond for Units 1-3).

2. Additional monitoring requirements are included to assure conformance with applicable Water Quality Standards and with probable variance requirements (See item G, below).

D. NPDES Serial Number 011 - Flue gas desulfurization system blowdown.

1. Limitations are as required by promulgated and proposed 40 CFR 423.15(c) for low volume wastes.

2. Additional monitoring requirements are included to assure conformance with applicable Water Quality Standards and with probable variance requirements (See item G, Below).

E. Calculation of quantity limitations for Serial Numbers 009, 010, and 011. Quantity limitations are calculated as follows:

Quantity (lbs/day)=8.345 x Flow (MGD) x Allowed Concentration (mg/l)

where: 8.345 is the appropriate conversion factor, flows are expected discharge flows as provided by the applicant (flow of ash sluice blowdown is five percent of the ash sluice flow for serial 010), and where concentrations (mg/l) are as provided in applicable subsections of 40 CFR 423.15, as noted below.

	30-day Average (Daily Average)	24-hour Average (Daily Maximum)
Total Suspended Solids	30	100
Oil and Grease	15	20

F. NPDES Serial Number 012 and 013 - Construction dewatering waste. Limitation is based on best professional judgement.

G. Variance. Ambient levels of arsenic, cadmium, chromium, copper, iron, mercury, nickel, and selenium exceed Florida Water Quality Standards Criteria in the Bay Waters. Therefore, the addition of any of these pollutants, regardless of how little the concentration exceeded the ambient level and/or the state criterion, would technically violate the water quality standards. Due to the relatively low expected addition of these pollutants, the applicant has requested and a variance to the state criteria for a two-year period after the start of commercial operation has been granted. During this period the permittee will be required to (1) monitor the discharge of pollutants, (2) operate the FGD blowdown treatment system so as to minimize the metal content of the discharge from the system, (3) explore the practicability of treating the boiler blowdown in the FGD treatment system when there is capacity in the system to accommodate that blowdown and (4) submit reports of the above studies and analyses after the first year and at least twenty months after the start of commercial operation. Additional information on ambient conditions and variance discussions are included in the Environmental Impact Statement.

H. Proposed Permit Period: Five years.
The NPDES permit requires compliance with the most stringent requirements of either the promulgated (October 8, 1974) or proposed (October 10, 1980) standards of performance for new sources (40 CFR 423.15). Data on priority pollutants has been submitted on Units 1-3, but samples can not be collected from Unit 4 waste sources since the plant is not yet in operation. Evaluation of expected effluent quality submitted by the applicant for Unit 4 and actual analyses from Units 1-3, have led the permit writer to the tentative conclusion that additional treatment for priroity pollutants is not likely for any pollutants (other than heavy metals as described in Item G above) and that a full five-year permit should be issued. However, to assure that this judgement is correct, the permittee will be required to submit priority pollutant data, not later than one year after the commercial operation date of Unit 4. Additionally, a reopener clause is included in the permit (Part III.G.) in the event that excessive levels of priority pollutants are found.

Appendix B

NPDES PERMIT AND RATIONALE FOR BIG BEND UNITS 1-3

The draft NPDES Permit for Units 1-3 contained in this Appendix is administratively complete (contains Parts 1, II and III), but is designed for combination with the draft permit for Unit 4 contained in Appendix A. Due to the different administrative procedures required for new sources (Unit 4) and existing sources (Unit 1-3), separate applications were submitted and different NPDES Numbers assigned. However, only one permit will be issued for all four units after completion of the Environmental Impact Assessment procedures applicable to Unit 4. NOTE: Changes made to the July 9, 1981, Draft Permit contained in the DEIS (except for the November 20 Draft date) are indicated by a bar in the margin as shown to the right.

Permit No.: FL0000817

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JAN 11 1982

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et. seq; the "Act"),

Tampa Electric Company
Post Office Box 111
Tampa, Florida 33601

is authorized to discharge from a facility located at

Big Bend Station
Units 1-3
Big Bend Road
North Ruskin, Florida 33570

to receiving waters named

Hillsborough Bay

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof. The permit consists of this cover sheet, Part I 7 pages(s), Part II 12 page(s) and Part III 1 page(s).

This permit shall become effective on

This permit and the authorization to discharge shall expire at midnight, , 1987

Date Signed

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from outfall(s) serial number(s) 001, 003 and 004 - Once-through condenser cooling water from Units 1, 2 and 3, respectively, to the plant discharge canal (005 1/).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations		Monitoring Requirements 1/	
	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type
Plant Discharge temperature °C(°F)	—	N/A	Continuous	Recorder
Plant temperature rise °C(°F)	9.3(16.8)	—	6/Day	Calculations
Total residual oxidants (mg/l)	SEE	BELOW	1/Week	Multiple Grabs
Time of TRO discharge (minutes/day)	SEE	BELOW	1/Week	Determinations

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Intake screen backwash is permitted without limitation or monitoring requirement.

There shall be no discharge from dilution pump(s) without prior approval by the Director, Enforcement Division, except that permittee is authorized to operate each pump for maintenance purposes not to exceed one-half hour per week.

Discharge of total residual oxidants(TRO) shall not exceed a maximum instantaneous concentration of 0.20 mg/l at the outlet corresponding to an individual unit during any one day. TRO shall not be discharged (except as noted below) from any unit for more than two hours in any one day and not more than one unit may discharge TRO at any one time. Notwithstanding these requirements, permittee shall institute the chlorine minimization study in accordance with plan of study submitted on February 25, 1981 and amended June 2, 1981. Status reports shall be submitted quarterly with Discharge Monitoring Reports (DMR's) indicating tests conducted and results obtained during the quarter with the first report due on October 28, 1981. Summary reports shall be submitted annually with the first report due on August 31, 1982. The summary report shall be in lieu of the April - June quarterly report. Chlorine use shall be minimized consistent with study results.

Permittee shall expeditiously, but in no case later than May 31, 1982, conduct a decay study of TRO in the discharge canal during a period when either Unit 2, or Unit 3, but not both, is in operation.

(CONTINUED)

PART I

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from outfall(s) serial number(s) 001, 003 and 004 - Once-through condenser cooling water from Units 1, 2 and 3, respectively, to the plant discharge canal (005 1/), (CONTINUED).

Not later than three years after promulgation or July 1, 1987, whichever is earlier, there shall be no discharge TRO. Notwithstanding the foregoing, the permittee may, upon showing the Director, Enforcement Division, that the facility must use chlorine for cooling water system biofouling control, discharge the minimum amount of TRO necessary to operate the facility. In no case shall TRO be dischargedfor more than two hours per day per discharge point nor shall the TRO exceed an instantaneous maximum of of 0.14 mg/l nor 0.20 mg/l instantaneous maximum to comply with Florida Water Quality Standards requirements, whichever is less. Not later than one year after promulgation, permittee shall submit a proposed implementation schedule to expeditiously provide controls necessary to comply with these requirements. Note: In the event that BAT regulations for control of TRO or chlorine are promulgated in a manner inconsistent with the October 14, 1980, proposed guidelines, requirements of this paragraph will be modified consistent with the promulgated regulations (40 CFR 423).

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Temperature in the plant discharge canal (005 1/) and total residual oxidants at the outlet corresponding to an individual unit prior to entering the plant discharge canal (end of individual flumes).

1/ Serial number 005 has been assigned for monitoring and reporting of flow, discharge temperature and temperature rise for the plant and shall be located after combination of serial numbers 001, 003 and 004. Reporting of flow and discharge temperature shall be provided as minimum, average and maximum based on average values for each calendar day for each month. Temperature rise shall be provided as the maximum weekly average value for each month based on calendar week average values. Records of average intake and discharge temperatures for each calendar day shall be maintained but not submitted.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from outfall(s) serial number(s) 002 - Slag pond effluent to discharge canal (includes boiler blowdown).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements	
	kg/day(lbs/day)		Other Units(mg/l)			
	Daily Avg	Daily Max	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow-m^3/Day(MGD)	—	—	—	—	Continuous	Recorder
Total Suspended Solids 1/	2/	2/	6.0 3/	24 3/	5/week	24-hr. Composite
Oil and Grease	470(1030)	620(1370)	15	20	2/month	Grab
Total Arsenic	N/A	N/A	N/A	0.30	5/two mo. 4/	24-hr. Composite
Total Cadmium	N/A	N/A	N/A	0.032	5/two mo. 4/	24-hr. Composite
Total Chromium	N/A	N/A	N/A	0.24	5/two mo. 4/	24-hr. Composite
Total Copper	N/A	N/A	N/A	0.14	5/two mo. 4/	24-hr. Composite
Total Iron	N/A	N/A	N/A	3.44	5/two mo. 4/	24-hr. Composite
Total Lead	N/A	N/A	N/A	N/A	5/two mo. 4/	24-hr. Composite
Total Mercury	N/A	N/A	N/A	0.1	5/two mo. 4/	24-hr. Composite
Total Nickel	N/A	N/A	N/A	0.22	5/two mo. 4/	24-hr. Composite
Total Selenium	N/A	N/A	N/A	0.32	5/two mo. 4/	24-hr. Composite
Total Zinc	N/A	N/A	N/A	N/A	5/two mo. 4/	24-hr. Composite

Not later than March 16, 1983, permittee shall evaluate alternative suspended metals removal systems, including costs and feasibility, and submit a report on this evaluation.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week on a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Pond effluent prior to entering plant discharge canal.

(CONTINUED)

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JAN 1 1 1982

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from outfall(s) serial number(s) 002 - Slag pond effluent to discharge canal (includes boiler blowdown). (CONTINUED)

1/ Total suspended solids data shall be tabulated, plotted vs. time, and submitted monthly by the 28th day of the following month.

2/ The quantity of total suspended solids discharged shall not exceed the quantity determined by multiplying the flow of slag sluice water and boiler blowdown times the difference between intake and discharge concentrations.

3/ Limitations have been applied on a net basis at the request of the permittee. Net values shall be computed by subtracting the intake value from the discharge value for the same date. In computing net values, negative values shall be considered zero. The Director, Enforcement Division may, on request by the permittee or based on a review of the permit file, modify the net effluent limitations in accordance with 40 CFR 122.15.

4/ Monitoring shall be conducted for five consecutive days each two months.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through June 30, 1982, the permittee is authorized to discharge from outfall(s) serial number(s) 006 - Coal pile runoff to plant intake canal.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations	Monitoring Requirements 1/	
	Instantaneous Maximum	Measurement Frequency	Sample Type
Flow-m^3/Day(MGD)	N/A	N/A	N/A
Total Suspended Solids(mg/1)	50 2/	2/week	Grab
Pond Water Level	N/A	3/week 3/	Staff Gage

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 2/week on a grab sample 1/, 2/.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Nearest accessible point after final treatment but prior to actual discharge or mixing with the receiving waters.

Subsequent to June 30, 1982, there shall be no discharge or bypass of coal pile runoff to waters of the U. S. or to any waste stream entering such waters.

1/ Monitoring for total suspended solids and pH is not required during periods of no discharge. During periods of discharge, sampling shall be representative.

2/ Applicable to any flow up to the flow resulting from a 24-hour rainfall event with a probable recurrance interval of once in ten years. If an impoundment is used by the permittee, it shall be capable of retaining the 10-year, 24-hour rainfall event. Overflows resulting from rainfall in excess of the 10-year, 24-hour event may be discharged without limitation (monitoring is required).

3/ When pond is within six inches of discharge elevation.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee shall monitor outfall(s) serial number(s) 007 1/ - Plant Intake

Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow—m^3/Day (MGD)	Continuous	Pump Logs
Intake Temperature $^{o}C(^{o}F)$	6/day	Logs
Total Suspended Solids (mg/1) 2/	5/week	24-hour Composite
Heavy Metals (See Below)	5/two months	24-hour Composite

Intake screen wash water may be discharged without limitations and monitoring requirements to the plant intake canal.

Monitoring for heavy metals in the plant intake shall be conducted for five consecutive days each two months on composite samples. Parameters collected shall include total arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium and zinc. All data values shall be submitted.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Plant Intake except that temperature shall be at the condenser inlet(s).

1/ This serial number is assigned for identification and monitoring purposes only, except as noted above for discharge of intake screen backwash.

2/ Total suspended solids data shall be tabulated, plotted vs time, and submitted monthly by the 28th day of the following month.

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B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

   a. Achieve effluent limitations - On effective date or start of discharge as applicable.

   b. Chlorine minimization (001, 003 and 004)
      (1) Implement - July 1, 1981.
      (2) Status Reports - Quarterly with DMR's, with first report due in October 1981 (3 per year).
      (3) Summary reports - Annually, with the first report due on August 31, 1982.
      (4) Implementation schedule (chlorine reduction controls) - One year after promulgation.

   c. Slag pond treatment evaluation (002) - Report submittal by March 16, 1983.

   d. Oxidant decay study (003 or 004) - Implement expeditiously, but no later than May 31, 1982.

   e. Terminate discharge (006) - June 30, 1982.

2. No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions, taken, and the probability of meeting the next scheduled requirement.

A. MANAGEMENT REQUIREMENTS

1. Discharge Violations

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant more frequently than, or at a level in excess of, that identified and authorized by this permit constitutes a violation of the terms and conditions of this permit. Such a violation may result in the imposition of civil and/or criminal penalties as provided in Section 309 of the Act.

2. Change in Discharge

Any anticipated facility expansions, production increases, or process modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new NPDES application at least 180 days prior to commencement of such discharge. Any other activity which would constitute cause for modification or revocation and reissuance of this permit, as described in Part II (B) (4) of this permit, shall be reported to the Permit Issuing Authority.

3. Noncompliance Notification

a. Instances of noncompliance involving toxic or hazardous pollutants should be reported as outlined in Condition 3c. All other instances of noncompliance should be reported as described in Condition 3b.

b. If for any reason, the permittee does not comply with or will be unable to comply with any discharge limitation specified in the permit, the permittee shall provide the Permit Issuing Authority with the following information at the time when the next Discharge Monitoring Report is submitted.

   (1) A description of the discharge and cause of noncompliance;
   (2) The period of noncompliance, including exact dates and times and/or anticipated time when the discharge will return to compliance; and
   (3) Steps taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

c. Toxic or hazardous discharges as defined below shall be reported by telephone within 24 hours after permittee becomes aware of the circumstances and followed up with information in writing as set forth in Condition 3b. within 5 days, unless this requirement is otherwise waived by the Permit Issuing Authority:

(1) Noncomplying discharges subject to any applicable toxic pollutant effluent standard under Section 307(a) of the Act;
(2) Discharges which could constitute a threat to human health, welfare or the environment. These include unusual or extraordinary discharges such as those which could result from bypasses, treatment failure or objectionable substances passing through the treatment plant. These include Section 311 pollutants or pollutants which could cause a threat to public drinking water supplies.

d. Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

4. Facilities Operation

All waste collection and treatment facilities shall be operated in a manner consistent with the following:

a. The facilities shall at all times be maintained in a good working order and operated as efficiently as possible. This includes but is not limited to effective performance based on design facility removals, adequate funding, effective management, adequate operator staffing and training, and adequate laboratory and process controls (including appropriate quality assurance procedures); and

b. Any maintenance of facilities, which might necessitate unavoidable interruption of operation and degradation of effluent quality, shall be scheduled during noncritical water quality periods and carried out in a manner approved by the Permit Issuing Authority.

c. The permittee, in order to maintain compliance with this permit shall control production and all discharges upon reduction, loss, or failure of the treatment facility until the facility is restored or an alternative method of treatment is provided.

5. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to waters of the United States resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature of the noncomplying discharge.

6. **Bypassing**

"Bypassing" means the intentional diversion of untreated or partially treated wastes to waters of the United States from any portion of a treatment facility. Bypassing of wastewaters is prohibited unless all of the following conditions are met:

a. The bypass is unavoidable-i.e. required to prevent loss of life, personal injury or severe property damage;

b. There are no feasible alternatives such as use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down time;

c. The permittee reports (via telephone) to the Permit Issuing Authority any unanticipated bypass within 24 hours after becoming aware of it and follows up with written notification in 5 days. Where the necessity of a bypass is known (or should be known) in advance, prior notification shall be submitted to the Permit Issuing Authority for approval at least 10 days beforehand, if possible. All written notifications shall contain information as required in Part II (A)(3)(b); and

d. The bypass is allowed under conditions determined to be necessary by the Permit Issuing Authority to minimize any adverse effects. The public shall be notified and given an opportunity to comment on bypass incidents of significant duration to the extent feasible.

This requirement is waived where infiltration/inflow analyses are scheduled to be performed as part of an Environmental Protection Agency facilities planning project.

7. **Removed Substances**

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the United States.

8. Power Failures

The permittee is responsible for maintaining adequate safeguards to prevent the discharge of untreated or inadequately treated wastes during electrical power failures either by means of alternate power sources, standby generators or retention of inadequately treated effluent. Should the treatment works not include the above capabilities at time of permit issuance, the permittee must furnish within six months to the Permit Issuing Authority, for approval, an implementation schedule for their installation, or documentation demonstrating that such measures are not necessary to prevent discharge of untreated or inadequately treated wastes. Such documentation shall include frequency and duration of power failures and an estimate of retention capacity of untreated effluent.

9. Onshore or Offshore Construction

This permit does not authorize or approve the construction of any onshore or offshore physical structures or facilities or the undertaking of any work in any waters of the United States.

B. RESPONSIBILITIES

1. Right of Entry

The permittee shall allow the Permit Issuing Authority and/or authorized representatives (upon presentation of credentials and such other documents as may be required by law) to:

a. Enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit;

b. Have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit;

c. Inspect at reasonable times any monitoring equipment or monitoring method required in this permit;

d. Inspect at reasonable times any collection, treatment, pollution management or discharge facilities required under the permit; or

e. Sample at reasonable times any discharge of pollutants.

2. Transfer of Ownership or Control

A permit may be transferred to another party under the following conditions:

a. The permittee notifies the Permit Issuing Authority of the proposed transfer;

b. A written agreement is submitted to the Permit Issuing Authority containing the specific transfer date and acknowledgement that the existing permittee is responsible for violations up to that date and the new permittee liable thereafter.

Transfers are not effective if, within 30 days of receipt of proposal, the Permit Issuing Authority disagrees and notifies the current permitttee and the new permittee of the intent to modify, revoke and reissue, or terminate the permit and to require that a new application be filed.

3. Availability of Reports

Except for data determined to be confidential under Section 308 of the Act, (33 U.S.C. 1318) all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Permit Issuing Authority. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Act (33 U.S.C. 1319).

4. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, terminated or revoked for cause (as described in 40 CFR 122.15 et seq) including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

c. A change in any condition that requires either temporary interruption or elimination of the permitted discharge; or

d. Information newly acquired by the Agency indicating the discharge poses a threat to human health or welfare.

If the permittee believes that any past or planned activity would be cause for modification or revocation and reissuance under 40 CFR 122.15 et seq, the permittee must report such information to the Permit Issuing Authority. The submission of a new application may be required of the permittee.

5. Toxic Pollutants

a. Notwithstanding Part II (B)(4) above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge authorized herein and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revoked and reissued or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified.

b. An effluent standard established for a pollutant which is injurious to human health is effective and enforceable by the time set forth in the promulgated standard, even though this permit has not as yet been modified as outlined in Condition 5a.

6. Civil and Criminal Liability

Except as provided in permit conditions on "Bypassing", Part II (A) (6), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

7. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act (33 U.S.C. 1321).

8. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

9. **Property Rights**

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

10. **Severability**

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

11. **Permit Continuation**

A new application shall be submitted at least 180 days before the expiration date of this permit. Where EPA is the Permit Issuing Authority, the terms and conditions of this permit are automatically continued in accordance with 40 CFR 122.5, provided that the permittee has submitted a timely and sufficient application for a renewal permit and the Permit Issuing Authority is unable through no fault of the permittee to issue a new permit before the expiration date.

C. MONITORING AND REPORTING

1. **Representative Sampling**

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. **Reporting**

Monitoring results obtained during each calendar month shall be summarized for each month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1). Forms shall be submitted at the end of each calendar quarter and shall be postmarked no later than the 28th day of the month following the end of the quarter. The first report is due by the 28th day of the month following the first full quarter after the effective date of this permit.

Signed copies of these, and all other reports required herein, shall be submitted to the Permit Issuing Authority at the following address(es):

Permit Compliance Branch
Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

3. Test Procedures

Test procedures for the analysis of pollutants shall conform to all regulations published pursuant to Section 304(h) of the Clean Water Act, as amended (40 CFR 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants").

4. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;

b. The person(s) who obtained the samples or measurements;

c. The dates the analyses were performed;

d. The person(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of all required analyses.

5. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form (EPA No. 3320-1). Such increased frequency shall also be indicated.

6. Records Retention

The permittee shall maintain records of all monitoring including: sampling dates and times, sampling methods used, persons obtaining samples or measurements, analyses dates and times, persons performing analyses, and results of analyses and measurements. Records shall be maintained for three years or longer if there is unresolved litigation or if requested by the Permit Issuing Authority.

D. DEFINITIONS

1. Permit Issuing Authority

The Regional Administrator of EPA Region IV or designee.

2. Act

"Act" means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) Public Law 92-500, as amended by Public Law 95-217 and Public Law 95-576, 33 U.S.C. 1251 et seq.

3. Mass/Day Measurements

a. The "average monthly discharge" is defined as the total mass of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such month. It is, therefore, an arithmetic mean found by adding the weights of the pollutant found each day of the month and then dividing this sum by the number of days the tests were reported. This limitation is identified as "Daily Average" or "Monthly Average" in Part I of the permit and the average monthly discharge value is reported in the "Average" column under "Quantity" on the Discharge Monitoring Report (DMR).

b. The "average weekly discharge" is defined as the total mass of all daily discharges sampled and/or measured during a calendar week on which daily discharges are sampled and/or measured divided by the number of daily discharges sampled and/or measured during such week. It is, therefore, an arithmetic mean found by adding the weights of pollutants found each day of the week and then dividing this sum by the number of days the tests were reported. This limitation is identified as "Weekly Average" in Part I of the permit and the average weekly discharge value is reported in the "Maximum" column under "Quantity" on the DMR.

c. The "maximum daily discharge" is the total mass (weight) of a pollutant discharged during a calendar day. If only one sample is taken during any calendar day the weight of pollutant calculated from it is the "maximum daily discharge". This limitation is identified as "Daily Maximum," in Part I of the permit and the highest such value recorded during the reporting period is reported in the "Maximum" column under "Quantity" on the DMR.

4. Concentration Measurements

a. The "average monthly concentration," other than for fecal coliform bacteria, is the concentration of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such month (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average monthly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar month. This limitation is identified as "Monthly Average" or "Daily Average" under "Other Limits" in Part I of the permit and the average monthly concentration value is reported under the "Average" column under "Quality" on the DMR.

b. The "average weekly concentration," other than for fecal coliform bacteria, is the concentration of all daily discharges sampled and/or measured during a calendar week on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such week (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all samples collected during that calendar day. The average weekly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar week. This limitation is identified as "Weekly Average" under "Other Limits" in Part I of the permit and the average weekly concentration value is reported under the "Maximum" column under "Quality" on the DMR.

c. The "maximum daily concentration" is the concentration of a pollutant discharged during a calendar day. It is identified as "Daily Maximum" under "Other Limits" in Part I of the permit and the highest such value recorded during the reporting period is reported under the "Maximum" column under "Quality" on the DMR.

5. Other Measurements

   a. The effluent flow expressed as M^3/day (MGD) is the 24 hour average flow averaged monthly. It is the arithmetic mean of the total daily flows recorded during the calendar month. Where monitoring requirements for flow are specified in Part I of the permit the flow rate values are reported in the "Average" column under "Quantity" on the DMR.

   b. Where monitoring requirements for pH, dissolved oxygen or fecal coliform are specified in Part I of the permit the values are generally reported in the "Quality or Concentration" column on the DMR.

6. Types of Samples

   a. Composite Sample - A "composite sample" is any of the following:

      (1) Not less than four influent or effluent portions collected at regular intervals over a period of 8 hours and composited in proportion to flow.

      (2) Not less than four equal volume influent or effluent portions collected over a period of 8 hours at intervals proportional to the flow.

      (3) An influent or effluent portion collected continuously over a period of 24 hours at a rate proportional to the flow.

   b. Grab Sample: A "grab sample" is a single influent or effluent portion which is not a composite sample. The sample(s) shall be collected at the period(s) most representative of the total discharge.

7. Calculation of Means

   a. Arithmetic Mean: The arithmetic mean of any set of values is the summation of the individual values divided by the number of individual values.

   b. Geometric Mean: The geometric mean of any set of values is the Nth root of the product of the individual values where N is equal to the number of individual values. The geometric mean is equivalent to the antilog of the arithmetic mean of the logarithms of the individual values. For purposes of calculating the geometric mean, values of zero (0) shall be considered to be one (1).

c. Weighted by Flow Value: Weighted by flow value means the summation of each concentration times its respective flow divided by the summation of the respective flows.

8. Calendar Day

a. A calendar day is defined as the period from midnight of one day until midnight of the next day. However, for purposes of this permit, any consecutive 24-hour period that reasonably represents the calendar day may be used for sampling.

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PART III

OTHER REQUIREMENTS

A. There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

B. The company shall notify the Director, Enforcement Division, in writing not later than sixty (60) days prior to instituting use of any additional biocide or chemical used in condenser cooling systems, other than chlorine, which may be toxic to aquatic life. Such notification shall include·

1. Name and general composition of biocide or chemical
2. Quantities to be used
3. Frequencies of use
4. Proposed discharge concentrations
5. EPA registration number, if applicable

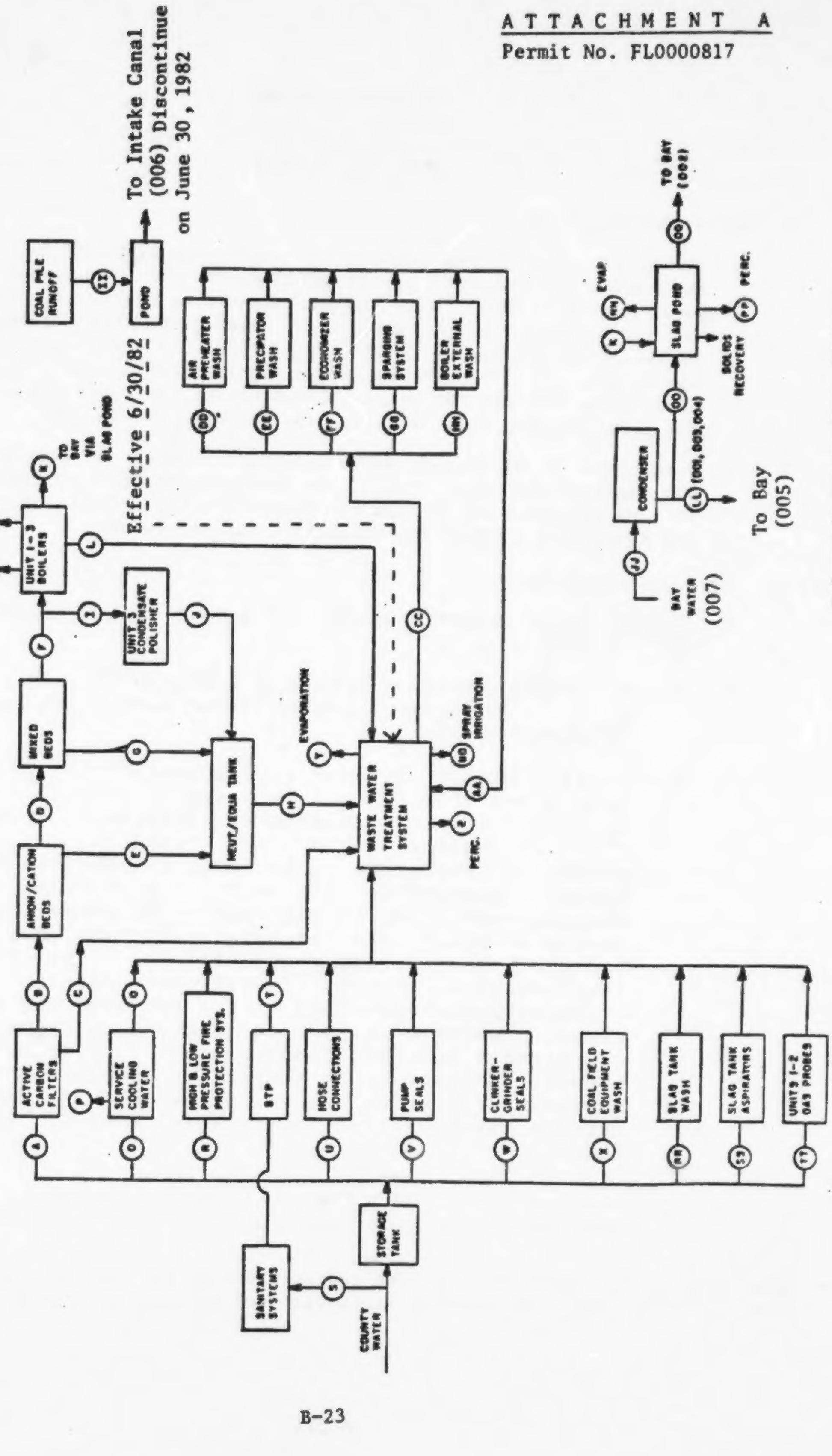
C. There shall be no discharge to waters of the United States of low volume wastes (wastewater from all sources except those for which specific limitations are otherwise required in this permit, including, but not limited to waste waters from wet scrubber air pollution control systems, ion exchange water treatment systems, water treatment evaporator blowdown, laboratory and sampling streams, floor drainage, cooling tower basin cleaning wastes and blowdown from recirculating house service water system), or metal cleaning wastes (including water wash operations).

D. If an applicable standard or limitation is promulgated under sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) and that effluent standard or limitation is more stringent than any effluent limitation in this permit or controls a pollutant not limited in this permit, this permit shall be promptly modified or revoked and reissued to conform to that effluent standard or limitation.

E. The State of Florida Department of Environmental Regulation has certified the discharge(s) covered by this permit with conditions (Attachment B). Section 401 of the Act requires that conditions of certification shall become a condition of the permit. The monitoring and sampling shall be as indicated for those parameters included in the certification. Any effluent limits and any additional requirements specified in the attached state certification which are more stringent, supersede any less stringent effluent limits provided herein. During any time period in which the more stringent state certification effluent limits are stayed or inoperable, the effluent limits provided herein shall be in effect and fully enforceable. (Note: Certification to be provided before permit issuance.)

ATTACHMENT A

Permit No. FL0000817


COUNTY WATER
SANITARY SYSTEMS
STORAGE TANK
S
A
ACTIVE CARBON FILTERS
O
SERVICE COOLING WATER
P
R
HIGH & LOW PRESSURE FIRE PROTECTION SYS.
STP
T
U
HOSE CONNECTIONS
V
PUMP SEALS
W
CLINKER-GRINDER SEALS
X
COAL FIELD EQUIPMENT WASH
RR
SLAG TANK WASH
SS
SLAG TANK ASPIRATORS
TT
UNITS 1-2 GAS PROBES
B
C
Q
ANION/CATION BEDS
D
E
MIXED BEDS
G
F
NEUT/EQUA TANK
I
UNIT 3 CONDENSATE POLISHER
J
H
UNIT 1-3 BOILERS
M
N
K
TO BAY VIA SLAG POND
L
Effective 6/30/82
EVAPORATION
Y
WASTE WATER TREATMENT SYSTEM
Z
PERC.
AA
BB
SPRAY IRRIGATION
CC
DD
AIR PREHEATER WASH
EE
PRECIPATOR WASH
FF
ECONOMIZER WASH
GG
SPARGING SYSTEM
HH
BOILER EXTERNAL WASH
COAL PILE RUNOFF
II
POND
To Intake Canal (006) Discontinue on June 30, 1982
BAY WATER (007)
JJ
CONDENSER
LL
(001, 003, 004)
To Bay (005)
OO
K
NN
EVAP.
SLAG POND
SOLIDS RECOVERY
PP
PERC.
QQ
TO BAY (002)

Schematic Water Flow Diagram
TECO Big Bend Units 1-3

JAN 11 1982

Big Bend Station
Units 1, 2 and 3
Permit Rationale
NPDES No. FL0000817

I. Applicable Regulations

A. The proposed conditions provide for compliance with (1) Effluent Guidelines and Standards for the steam electric power generating point source category (40 CFR 423) as promulgated on October 8, 1974 (39 Federal Register 36186), and with proposed guidelines revisions published on October 14, 1980 (45 FR 68328) for plant chemical wastes; and (2) a tentative determination under sections 316(a) and 316(b) of the Clean Water Act for the thermal component of the discharge and for the plant cooling water intake, respectively; as well as,

B. Provisions of the Florida Water Quality Standards (Chapter 17-3, Florida Administrative Code). The receiving waters have been classified by the State of Florida as Class III - Recreation - Propagation and Management of Fish and Wildlife - Surface waters.

II. Effluent Limitations

A. Outfall Serial Numbers 001, 003, 004 and 005* - Once-through Cooling Water

1. Temperature: A weekly average of 9.3°C(16.8°F) is included based on the 316(a) Determination, historical data and expected future operating levels.

2. Total residual oxidants (total residual chlorine): Limitation of 0.20 mg/l is based on Florida Water Quality Standards and is more stringent than effluent guidelines (40 CFR 423.12(b)(7)). Details of the rationale are included in the Environmental Impact Statement for Big Bend 4. A detailed chlorine minimization study is underway to determine minimum levels of chlorine necessary for biofouling control and the permit requires minimization consistent with study results. Future limitations consistent with proposed guidelines (423.13 (b) through (d)) are included. Additionally, a decay study on oxidant concentrations in the discharge canal is required by the permit. Subsequent to completion of these studies, permit modification can be pursued should conditions require further reduction in total residual oxidant level.

3. Flow: Use of dilution pumps is prohibited (except for once per week maintenance) consistent with the 316(b) Determination.

* Discharge serial number 005 has been redesignated as the combined cooling water discharge (001, 003, and 004) for limitation and monitoring purposes.

B. Outfall Serial Number 002 - Slag Pond Discharge

1. Total suspended solids - Data submitted by the applicant has demonstrated that total suspended solids (TSS) present in the plant intake water are passing through the slag pond in concentrations which exceed effluent limitations (40 CFR 423.12(b)(4) and proposed 423.14(c)). Therefore, effluent limitations have been included in the draft permit based on a "net" basis as allowed in 40 CFR 122.63(h). Additional monitoring for TSS and heavy metals is included in the draft permit to demonstrate continued eligibility for and compliance with the net limitations.

   Ambient levels of arsenic, cadmium, chromium, copper, iron, mercury, nickel and selenium exceed Florida Water Quality Standards Criteria; therefore, the addition of any of these parameters would technically violate the Standards. Due to the relatively low levels of addition, a variance to State criteria has been granted for a two-year period. During this period, the Permittee will be required to evaluate additional treatment alternatives to reduce or eliminate the discharge of suspended heavy metals. Additional treatment technologies could include chemical precipitation, filtration and/or recycle, etc. A report on this evaluation is required by March 16, 1983 (18 months after granting the variance), subsequently determinations will be made as to requirements for additional treatment. Information on ambient conditions and variance discussions are included in the Environmental Impact Statement for Big Bend Unit 4.

2. Oil and grease and pH permit requirements are based on requirements of 40 CFR 423.12(b)(1) and (4) and proposed 423.14(c) and (e). Quantity limitations for oil and grease are based on 15 and 20 mg/l as 30-day (daily average) and one-day (daily maximum) concentrations, respectively. Flow is based on the application (8.21 MGD average). The calculation is as follows: Quantity (lbs/day) = Concentration (mg/l) x Flow(MGD) x Conversion factor, where 8.345 is the appropriate conversion factor.

C. Outfall Serial Number 005

The application was for boiler blowdown to the slag pond; however, historical data indicates that concentrations of iron and copper have been significantly below requirements of 40 CFR 423.12(b)(6). A best professional judgement has been made that future concentrations of iron and copper should be no greater than historical values and even if they were, the slag pond would provide adequate treatment. Additionally, proposed 40 CFR 423.12 and 423.14 have deleted boiler blowdown as a separate category and have included it in the low volume waste category which is not subject to iron and copper limitations. Therefore, boiler blowdown has been excluded from separate monitoring and this waste is covered in requirements for OSN 006. OSN 005 has been redesignated as previously indicated.

D. Outfall Serial Number 006 - Coal Pile Runoff
Limitations are based on 40 CFR 423.42 and proposed 40 CFR 423.12(b)(9) and (10) and 423.14(a).

E. Other Waste Sources: Low volume wastes and metal cleaning wastes are discharged to onsite ponds for evaporation and percolation and/or are spray irrigated on the plant site. No discharge to waters of the United States occurs and therefore no limitations are included in the draft permit. Fly ash is handled dry and is presently sold.

F. Priority Pollutant Data

Data as required by 40 CFR 122.53 (d)(7)(ii) has been submitted by the applicant making it eligible for a five-year permit. Best professional judgement evaluation of the data indicates that no additional treatment is required for priority pollutants, with the possible exception of heavy metals present in the slag pond effluent. However, a final decision will be contingent on the State granting and EPA approving a variance as indicated in Item B. above. Should reduction of heavy metals be necessary, treatment technology is available to produce acceptable effluent quality (chemical precipitation, filtration, etc.)

G. Proposed Permit Period: Effluent limitations have been included in the draft permit to assure compliance with all promulgated and proposed revisions to 40 CFR 423. Additionally, a reopener clause (Part III.D.) has been included in the draft permit should more stringent requirements be promulgated than are presently proposed. (Also see Item F. above.) A five-year permit is proposed.

Appendix C

FINAL ORDER - FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION - VARIANCE TO STATE WATER QUALITY STANDARDS

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TAMPA ELECTRIC COMPANY,)
)
Petitioner,)
)
vs.) Case No. 81-1463
)
STATE OF FLORIDA, DEPARTMENT)
OF ENVIRONMENTAL REGULATION,)
)
Respondent.)

FINAL ORDER

BY THE DEPARTMENT:

On August 5, 1981, the duly appointed hearing officer in this case completed and submitted to the Department and all parties a Recommended Order, consisting of Findings of Fact, Conclusions of Law and Recommendation. A copy of the Recommended Order is attached hereto as Exhibit "A".

Pursuant to Section 17-1.68(1), Florida Administrative Code, and Section 120.57(1)(b)(8), Florida Statutes, parties are allowed ten (10) days in which to submit written exceptions to the Recommended Order. Neither party submitted exceptions. The Recommended Order thereafter came before me, as head of the Department, for final agency action on this matter.

Having considered the Recommended Order, including Findings of Fact, Conclusions of Law and Recommendation of the hearing officer, it is therefore:

ORDERED by the State of Florida, Department of Environmental Regulation that the hearing officer's Recommended Order is hereby adopted *in toto* as the final action of this agency.

Further, as agreed to by Petitioner, the following effluent limitations shall apply to the discharge from the saltwater slag pond during the period of this variance:

Parameter	Effluent Limitations
Arsenic	0.30 mg/l
Cadmium	0.032 mg/l
Chromium	0.24 mg/l
Copper	0.14 mg/l
Iron	3.44 mg/l
Mercury	0.1 mg/l
Nickel	0.22 mg/l
Selenium	0.32 mg/l

DONE AND ENTERED this 16 day of September 1981, in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

Victoria Tschinkel
VICTORIA J. TSCHINKEL
Secretary

2600 Blair Stone Road
Tallahassee, Florida 32301
Telephone: (904) 488-4807

FILING AND ACKNOWLEDGEMENT

FILED, on this date, pursuant to §120.52 (9), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

D. Quigg for Linda Berard 9-17-81
Clerk Date

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing FINAL ORDER has been furnished by U. S. Mail to DIANE TREMOR, Hearing Officer, Division of Administrative Hearings, The Oakland Building, 2009 Apalachee Parkway, Tallahassee, Florida 32301; LAWRENCE N. CURTIN, ESQ., Holland and Knight, P.A., Post Office Drawer BW, Lakeland, Florida 33802; HAMILTON S. OVEN, JR., Administrator, Power Plant Siting, Department of Environmental Regulation (by inter-office mail); WILLIAM HENNESSEY, District Manager, Southwest District, Department of Environmental Regulation (by inter-office mail) and ROXANE DOW, Environmental Specialist IV, Division of Permitting, Department of Environmental Regulation (by inter-office mail) on this 17th day of September 1981.

Louis F. Hubener
LOUIS F. HUBENER
Assistant General Counsel
State of Florida, Department of
Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301
Telephone: (904) 488-9730

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Dept. of Environmental Regulatio
Office of General Counsel

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

TAMPA ELECTRIC COMPANY,
Petitioner,

vs.

DEPARTMENT OF ENVIRONMENTAL
REGULATION,
Respondent.

Case No. 81-1463

RECOMMENDED ORDER

Pursuant to notice, an administrative hearing was held before Diane D. Tremor, Hearing Officer with the Division of Administrative Hearings, on June 23, 1981, in the Hillsborough County Courthouse, Tampa, Florida. The issue for determination at the hearing was whether the Department of Environmental Regulation should grant Tampa Electric Company's petition for a variance from certain Florida water quality standards for the discharge from the existing slag pond for Units 1, 2 and 3 of the Big Bend Generating Station located in Hillsborough County, Florida. The parties agreed upon all issues at or prior to the hearing and their Joint Exhibits 1, 2 and 3 were received into evidence.

APPEARANCES

For Petitioner:
Lawrence N. Curtin
Holland & Knight
Post Office Drawer BW
Lakeland, Florida 33802

For Respondent:
Louis F. Hubener
Assistant General Counsel
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

FINDINGS OF FACT

Upon consideration of the petition for a variance, the recommendation of the Department of Environmental Regulation

EXHIBIT "A"

and the prehearing stipulation of the parties, the following relevant facts are found:

(1) Tampa Electric Company is the owner and operator of the Big Bend Generating Station which presently consists of three coal fired steam electric generating units (Units 1, 2 and 3) in Hillsborough County, Florida. The Big Bend Generating Station is located on the eastern shore of Hillsborough Bay, a Class III body of water. Discharges from the Big Bend Station are subject to regulation by the Department of Environmental Regulation.

(2) The discharge that is the subject of this proceeding is from the slag pond currently serving Big Bend Units 1, 2 and 3. Tampa Electric Company originally requested variances from the surface water quality standards contained in Rules 17-3.051 (minimum criteria), 17-3.061(2) (general prohibition), 17-3.061(2)(a) (arsenic), 17-3.061(2)(d) (chromium), 17-3.061(2)(h) (lead), 17-3.121(9) (cadmium), 17-3.121(11) (copper), 17-3.121(16) (iron), 17-3.121(17)(lead), 17-3.121(18) (mercury), 17-3.121(19) (nickel), and 17-3.121(26) (selenium) of the Florida Administrative Code for the discharge from this existing slag pond. At the hearing, Tampa Electric Company withdrew its request for variances from the provisions of Rules 17-3.051 (minimum criteria), 17-3.061(2) (general prohibition), and 17-3.061(2)(h) and 17-3.121(17) (lead).

(3) Data collected by Tampa Electric Company during the period of 1970 through 1974, 1980 and 1981 demonstrate that the quality of the ambient intake water in Hillsborough Bay contains concentrations of arsenic, chromium, cadmium, copper, iron, mercury, nickel, and selenium in amounts which periodically exceed the applicable Florida water quality standards for that water body as contained in Chapter 17-3, Florida Administrative Code.

(4) Water quality data for the Big Bend Units 1, 2 and 3 slag pond discharge collected during the 1980-1981 study demonstrate that there will be either minimal or no net increase, or a reduction between the ambient intake and discharge for all metals except iron and selenium. Upon mixing with the flow in the discharge canal, water quality impacts due to these parameters are expected to be minimal.

(5) The Department of Environmental Regulation has recommended granting a variance for the parameters cadmium, mercury and nickel based upon the following:

(a) mercury concentrations decrease upon passing through the slag pond;

(b) cadmium and nickel concentrations remain the same passing through the slag pond; and, therefore,

(c) the slag pond system does not appear to contribute to the existing water quality violations for cadmium, mercury, or nickel.

(6) The Department of Environmental Regulation's analysis of the other parameters indicates that the concentrations of arsenic, chromium, iron and selenium increase in passing through the slag pond system. This increase appears to be due to an increase in suspended metals.

(7) Additional treatment of the discharge from the slag pond would be necessary to meet water quality criteria in the effluent for the parameters arsenic, chromium, iron and selenium. Compliance would require further removal of these parameters possibly by the use of a reverse osmosis treatment system. The cost of treating the slag pond discharge pond stream to comply with water quality standards by use of reverse osmosis would be approximately $28.2 million. The $28.2 million expenditure is not justified or practicable in this case. The Department of Environmental Regulation

agrees that this expenditure is not justified in this case and has recommended a variance for these parameters as well.

(8) The damage or harm resulting or which may result to Tampa Electric Company from compliance with the rules from which the variance relief is sought would be the expenditure of $28.2 million for an additional treatment system with no significant resulting benefit to the environment. The failure of the Department of Environmental Regulation to grant the requested variance could result in Tampa Electric Company being unable to operate this facility.

(9) The Department of Environmental Regulation recommends a two-year variance from the surface water quality standards contained in Rules 17-3.061(2)(a) (arsenic), 17-3.061(2)(d) (chromium), 17-3.121(9) (cadmium), 17-3.121(11) (copper), 17-3.121(16) (iron), 17-3.121(18) (mercury), 17-3.121(19) (nickel), and 17-3.121(26) (selenium) of the Florida Administrative Code for the discharge from the slag pond serving existing Big Bend Station Units 1, 2 and 3. The recommendation is conditioned upon Tampa Electric Company's agreement to monitor the metal content of the slag pond discharge, to evaluate alternative treatment systems and to submit a report describing treatment systems evaluated, including costs and feasibility, within eighteen (18) months of the effective date of the variance relief. Tampa Electric Company has agreed to the recommendation and conditions of the Department of Environmental Regulation.

(10) Appropriate public notice of this proceeding has been given. At the conclusion of the hearing, the public was given an opportunity to comment and present evidence on the petition for variance. No public testimony was offered.

CONCLUSIONS OF LAW

Within its discretion, the Department of Environmental Regulation may grant a variance from its rules relating to water quality for any of the following reasons:

> (a) There is no practicable means known or available for the adequate control of the pollution involved.
>
> (b) Compliance with the particular requirement or requirements from which a variance is sought will necessitate the taking of measures which, because of their extent or cost, must be spread over a considerable period of time. A variance granted for this reason shall prescribe a timetable for the taking of the measures required.
>
> (c) To relieve or prevent hardship of a kind other than those provided for in paragraphs (a) and (b). Variances and renewals thereof granted under authority of this paragraph shall each be limited to a period of 24 months except that variances granted pursuant to part II may extend for the life of the permit or certification. §403.201, Fla. Stats.

Also see Rule 17-1.57, Florida Administrative Code.

In this proceeding, the record establishes that the pond system does not contribute to existing water quality violations for cadium, mercury or nickel. Therefore, a variance for these parameters should be granted.

Due to an increase in suspended metals, the parameters of arsenic, chromium, iron and selenium increase when passing through the slag pond system. While the resulting water quality violations might be cured by the use of a reverse osmosis treatment system, the cost of so treating the slag pond discharge stream - $28.2 million - is not justified or practicable and would result in no significant benefit to the environment. Other less costly treatment or filtration systems to remove suspended metals should be explored and evaluated by Tampa Electric Company and the metal content of the slag pond discharge should be monitored. For these reasons, as well as the fact that Tampa Electric Company could lose its ability to operate this electrical power facility without a variance, Tampa Electric Company should be granted a variance from the rules relating to arsenic, chromium, iron and selenium.

Tampa Electric Company has withdrawn its requests for variances from the rules relating to minimum criteria, general prohibition and lead.

RECOMMENDATION

Based upon the findings of fact and conclusions of law recited herein, it is RECOMMENDED that Tampa Electric Company be granted a two-year variance from the surface water quality standards contained in Rules 17-3.061(2)(a) (arsenic), 17-3.061(2)(d) (chromium), 17-3.121(9) (cadmium), 17-3.121(11) (copper), 17-3.121(16) (iron), 17-3.121(18) (mercury), 17-3.121(19) (nickel) and 17-3.121(26) (selenium), Florida Administrative Code, for discharges from the slag pond for existing Big Bend Station Units 1, 2 and 3. The granting of this variance should be conditioned upon Tampa Electric Company's agreement to monitor the metal content of the slag pond discharge during the duration of the variance, evaluate alternative suspended metals removal treatment systems, and submit a report to the Department of Environmental Regulation describing the treatment systems evaluated and the costs and feasibility of those systems within eighteen (18) months of the effective date of the variance.

Respectfully submitted and entered this 5th day of August, 1981, in Tallahassee, Florida.

Diane D. Tremor
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